



Getting the 'Eagle' Off the Ground

Conclusion of Two-Part Preview Follows Page 48

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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NEWSPAPER

Both Tymnet, SBS Planning To Build Wideband Nets

By Phil Hirsch

CW Washington Bureau
WASHINGTON, D.C. — Tymnet, Inc. and Satellite Business Systems (SBS) each asked the Federal Communications Commission last week for authority to build wideband, digital local-distribution networks in major U.S. metropolitan areas. These digital termination systems (DTS) would transmit data directly to and from a user's site at speeds of 2,400- to 1.5M bit/sec.

Besides being less error-prone and supporting far higher bit rates than telephone company-provided analog local loops, DTS channels are likely to cost the user far less for nominally equivalent service. DTS rates may also be considerably lower than those now charged for digital wideband offerings such as AT&T's Dataphone Digital Service.

Electronic mail, high-speed facsimile and teletext are among the services likely to be supported by DTS networks. Generically, DTS networks are usually referred to

as digital electronic message services (Dems), although SBS plans to call its version the Data Exchange Service (DXS).

Tymnet, a national and international value-added carrier that now offers intercity packet-switched communications services, wants to establish DTS networks in 50 cities during the next six years. The first two networks, in New York and San Francisco, (Continued on Page 8)

50% More Power, Same Price

Magnuson Adds Rival for 4331-1

By Jeffrey Beeler

CW West Coast Bureau
SAN JOSE, Calif. — Magnuson Computer Systems, Inc. extended its IBM-compatible processor line downward last week with the introduction of a medium-scale mainframe that reportedly provides 50% more computing power than the IBM 4331 Group 1 for about the same price.

Unlike its 4300 series coun-

terpart, the Magnuson M80/30 reportedly supports the full range of IBM's 370 oper-

How does Magnuson's new processor stack up against the other M80s? Chart on Page 8.

ating systems, including MVS, which is unavailable with the 4331 Group 1.

The M80/30 also accommodates up to eight times more

By Tim Scannell

CW Staff
NORFOLK, Va. — A federal district court jury here has decided in favor of Burroughs Corp. in the first user suit involving its B800 computer system to come to trial. The ruling could have a far-reaching impact on the more than 100 suits filed against the vendor over the B800.

Williams Industries, Inc., a publicly held multicorporate

construction firm based in Merrifield, Va., had refused to pay Burroughs for its B800 system, claiming that the computer and its applications software were defective. The user was found guilty in the U.S. District Court for the Eastern District of Virginia on breach of contract charges and ordered to pay the vendor nearly \$115,000, which covers the amount owed on the B800 as

well as legal fees accrued as a result of the trial.

The jury found Burroughs not guilty in a \$2.3 million countersuit filed by Williams, which accused the vendor of breach of contract, breach of warranty and constructive fraud.

Williams intends to appeal the court's decisions, according to the firm's secretary/treasurer, Arthur V. Conover III.

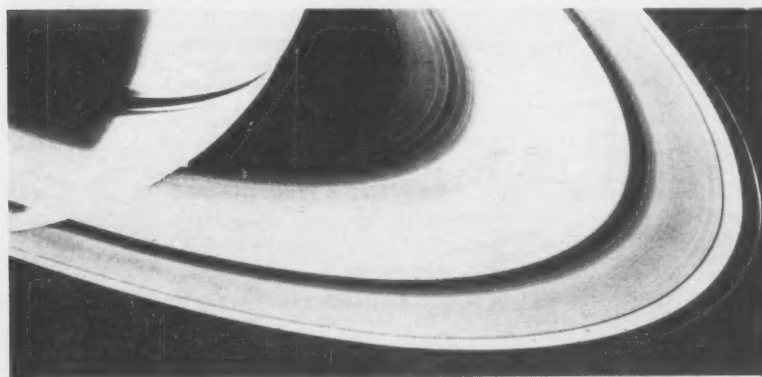
Questioned last week about the outcome of the case, Ralph Albright, Burroughs' attorney in the case, said he believes the court decision will have a significant impact on the other B800 user suits currently pending against the Detroit-based vendor. "The merits of the case, the actual facts, were the persuasive ones that led the jury to award Burroughs its verdict," Albright stated. "The facts were so clearly in Burroughs' favor that reasonable people could hardly differ."

However, Marvin Benn, an Illinois attorney representing or advising more than 40 users in suits against Burroughs, believes the recent decision involving the B800 will not have any impact on future trials.

"It's not the same case, they never got the system up. All of our people in all of our cases that we have alleged have attempted to put the system up," Benn said.

Although Williams' prob-

(Continued on Page 10)



Nasa Photo

More Pictures Tomorrow

Captured by Voyager 1 last year while nearly one million miles from the planet, this photograph shows Saturn's mysterious ring system fanning out from the equator. To-

morrow the Voyager 2 spacecraft, navigated and operated under elaborate computer commands, will make its closest pass by Saturn. Story on Page 4.

Computerworld Extra!

It's in the mail — 126 pages on "Systems Productivity: Harvesting the Rewards" that include a probing interview with Daniel D. McCracken and a revealing look at what makes the Japanese so productive.

You can harvest some productivity rewards of your own by checking your mailbox this week for the third edition of Computerworld Extra!



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ABP **MCC**
 MEDIA DATA FORM

Justice Department Task Force Comes Out For Proposed FBI Crime Data Network

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — A special Justice Department task force has jumped feet first into the long-standing controversy over national police data banks by recommending federal funding for a computerized criminal information system now under limited development by the Federal Bureau of Investigation (FBI).

The bureau's National Crime Information Center (NCIC) here is in the evaluation stages of a telecommunications/data base proposal called the Interstate Identification Index (III), conceived as a decentralized alternative to an earlier NCIC central data base and message-switching plan stymied for years in Congress.

Under the III plan, NCIC would maintain a national index to state criminal history records. States querying NCIC about individuals would be advised which states, if any, maintain criminal records on them. The

states involved would then communicate directly through a national telecommunications system not controlled by the FBI [CW, May 26, June 9, 1980].

If the eight-state III prototype test is successful, the Attorney General's Task Force on Violent Crime said, Justice should immediately begin developing the index "and should ensure that adequate computer support and staff are available to develop and maintain it for the federal government, all 50 states, the District of Columbia and appropriate areas of federal jurisdiction outside of the U.S."

The task force, cochaired by former U.S. Attorney General Griffin B. Bell and Illinois Gov. James R. Thompson, presented its findings and recommendations last Monday. Most of the recommendations deal with such law enforcement issues as narcotics, arson, gun control, pretrial releases and bail. The III recommendation, while not as broadly controversial as

some of the others, does catapult high levels of the Reagan administration into the 10-year debate that has crippled FBI efforts to institute an automated nationwide criminal information system.

More controversial is the second part of the III recommendation, which states that if the prototype is not feasible, the FBI should "develop alternative proposals for the exchange of federal, state and local criminal history information, which may include a national data base of such records or message switching."

However, that type of centralized, possibly FBI-controlled system is exactly the configuration that has been mired in congressional disapproval since 1971. The NCIC's Computerized Criminal History (CCH) program, initiated that year, has been steadfastly opposed on Capitol Hill by a number who argue it would constitute a national police data base. They further argue that FBI involvement in message switching of records between states would be a usurpation, perhaps unconstitutional, of traditionally state-level law enforcement authority.

In addition, the CCH program never caught on with the states themselves and has suffered decreasing participation.

The Justice task force said federal grants would help states develop their own computerized information systems and encourage them to participate in the III. However, a forthcoming congressional study suggests this might not be the case.

The congressional Office of Technology Assessment (OTA) is now putting the finishing touches on a long-term, in-depth study of alternative approaches to computerized criminal history systems. While the report will not be out for at least a month, OTA research found a great divergence of opinion among states over the merits of the III.

Four Accused of Smuggling High Tech to East Germany

Special to CW

LOS ANGELES — A grand jury here has delivered indictments against Werner Bruchhausen and three others charging they conspired to ship \$8 million worth of computers, semiconductor manufacturing equipment and related technology to East Germany without required licensing.

The 60-count indictment, delivered Aug. 19, represents the largest single prosecution ever attempted against alleged high-technology smugglers. The action follows an intensive 18-month investigation by U.S. and West German customs agencies, the U.S. Departments of Justice and Commerce and by the Internal Revenue Service.

According to the U.S. attorney involved in the case, the conspiracy

More details next week.

used numerous corporate "shells" to cover smuggling activity. U.S. companies allegedly victimized in the scheme include Watkins-Johnson Co. and Tamarack.

The charges brought against Bruchhausen and the other three include violations of the Export Administration Act, Arms Export Control Act, conspiracy, income tax evasion and perjury.

Defense attorneys could not be immediately reached for comment.

This Week

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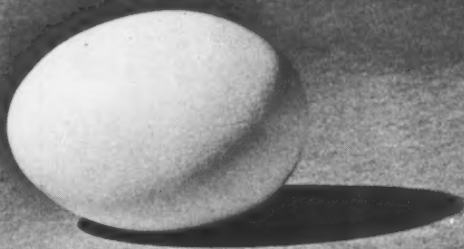
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'Voyager 2' to Skirt Planet Saturn Tomorrow

By Bill Laberis
CW Staff

PASADENA, Calif. — Four years and one billion miles from home, the *Voyager 2* spacecraft will skirt Saturn tomorrow, transmitting a high-speed stream of digital signals that scientists hope will help solve the riddle of the rings.

Powered in sling-shot fashion by Jupiter's gravity, *Voyager 2* will hurtle past Saturn's ethereal rings at 35,000 miles per hour making its closest approach (63,000 miles) to the planet's cloud-covered surface at precisely 11:25 p.m. Eastern Daylight Time.

Data gathered by the one-ton craft's cameras and sensors will flow back to mission control at the Jet Propulsion Laboratory (JPL) here at 44,000 bit/sec. The signals, traveling at the speed of light, will take an hour and a half to reach earth capture dishes.

Despite the seemingly unnavigable distance separating the spacecraft from home, *Voyager 2*'s computer-guided odyssey will take it within 30 miles of its targeted flight path by Saturn.

While that is happening, the JPL's mainframes will digest and analyze data sent by *Voyager 2* that ranges from the size, shape and number of rings encircling Saturn's fiery equator to the composition of micron-size dust particles and aerosols in the planet's frigid atmosphere.

"When you look at the scale of things in this mission, it is a little remarkable even to us that we can keep *Voyager* on track and functioning as we do," admitted Dr. James P. McDaniel, *Voyager 2* navigation team chief at the JPL.

"We're talking control over a range of a billion-and-a-half kilometers while our computers are looking for changes in that range in the order of a few meters. That demands mathematical modeling precision of the absolute highest order."

Holding *Voyager 2* on its true course

An Epic Told Mainly in Pictures

PASADENA, Calif. — The story of the *Voyager 2* spacecraft and its journey past Saturn will be an epic told largely in pictures.

But unlike anything ever shot from earth, the computer-enhanced photos snapped by *Voyager 2* on its closest pass by Saturn tomorrow will be of extraordinary resolution, the kind needed to unlock the ringed giant's many secrets.

And it will be the job of the image processing team at the Jet Propulsion Laboratory (JPL) here "to turn literally billions of bits sent by *Voyager* into meaningful pictures and data," according to team member Andy Collins.

Stated simply, *Voyager 2* will snap photos — about 18,000 in all — and expose them on its very long focal length camera. The exposed shot will then be read out on-board as an analog signal, digitized, then beamed back to earth by *Voyager*'s 20W transmitter at 44,000 bit/sec and stored on disk. That is a data transmission rate less than half as fast as that possible when *Voyager* passed Jupiter two years ago, but four times faster than what will be achieved when *Voyager* skirts Uranus five years from now.

"To the naked eye and to the camera, Saturn appears as a pale, butterscotch-colored planet, without a great deal of shading," Collins said. "But once the photos taken are digitized and sent back, we are looking at a completely different thing."

When digitized, each photo is broken into 640,000

eight-bit bytes, with one of more than 250 different brightness "labels" assigned to each of the 640,000 picture elements. This means every photo sent by *Voyager 2* back to earth translates into 5,120,000 bits, with just under two minutes needed to transmit a complete photo.

"With a black-and-white photo, the computer can resolve about 250 different shades of gray, compared to the 15 or so shades the naked eye can resolve," Collins said. "We are talking tremendous clarity given by the ability of the computer to grossly exaggerate the brightness the camera sees and records."

"From the difference of the planet's position in successive shots taken, the computer can, among many other things, calculate stellar wind velocity based on a programmed map that has about 15,000 velocity vectors," Collins said.

"It will also correct for camera imperfections, restoring geometric fidelity to the images observed while giving a nearly perfect record of the relative brightness of different bodies in space. This is very important in the navigation effort."

The image processing team uses the JPL's 3M-byte IBM 370/158 as the central imaging processor; the mainframe runs under MVS with TSO. In addition, the team works with a number of Digital Equipment Corp. PDP-11/40 and 11/34 minicomputers, all accessing several disk and dual-density tape drives made by Control Data Corp.

takes the combined efforts of ground analysts working in tandem with two different computer systems, which in turn interact with one another, McDaniel explained.

System Anchor

One system is anchored by the JPL's general-purpose time-sharing CPU, a Univac 1100. Voluminous files of navigational data, some of which was culled from information sent to earth by *Voyager 1* when it passed Saturn last November, are stored on disk and accessed by the mainframe.

The files, which have been updated continuously since *Voyager 2* was launched in August 1977, contain

data on every force and variable, no matter how minute, that can affect the spacecraft's flight. Special applications software written primarily in Fortran analyze changes and additions to the data files, helping determine how ground crews will alter *Voyager 2*'s course to compensate for the changes.

"For example, during the last year we discovered many new satellites orbiting around Saturn, and their presence can influence *Voyager*'s flight path, if only a tiny bit," McDaniel said.

"Bear in mind that even a tiny influence can add up to a lot of distance off course when you consider

Voyager's next rendezvous (with Uranus) is four-and-a-half years and well over a billion miles away."

In addition, the main system's files and software are continually updated to account for those things that influence how the data transmitted is observed here on earth.

Scientists have discovered that *Voyager*'s signals are slowed down, however slightly, by trace amounts of plasma in the earth's ionosphere. And the tracking stations, located in California, Spain and Australia, wobble as the earth's crust shifts beneath them.

The second system works on a real-time basis with data sent by *Voyager* as it courses through space. This segment of the navigational effort involves the digital image analysis of the spacecraft's field of view (see accompanying article on image processing).

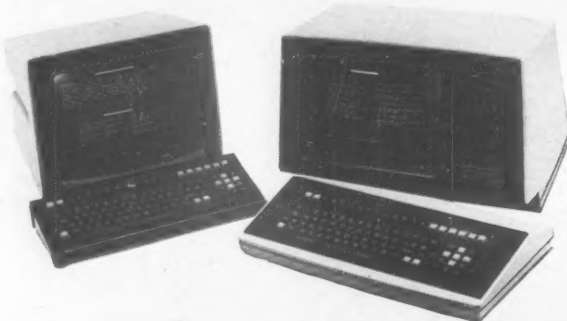
Essentially, the computer-enhanced photos transmitted are studied for the locations of dim stars and satellites, their positions and distances analyzed with respect to the spacecraft.

This image extraction technique to find *Voyager*'s exact location is handled by a Modular Computer Systems, Inc. Modcomp 4 minicomputer with which scientists perform real-time image enhancement on interactive display monitors.

This system's findings are then sent across an electronic interface to the Univac 1100, which processes the information into the main orbit determination program, McDaniel explained.

"It is a dynamic, not a static, environment out there, so you can imagine how our systems people have their hands full," he said. "We have to make continual adjustments and improvements in our applications software, especially as *Voyager* moves further out. That's the key now — software."

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CW Telephone Survey Finds Wall Between DPer, Users Tumbling Down

By Brad Schultz
CW New York Bureau

The wall between DP departments and user departments is tumbling down.

Computerworld got that message last week from 28 telephone interviews with 13 U.S. companies and a federal installation. The companies included six manufacturers, two insurance firms, two banks, a retailer, a utility and a publisher.

The DP manager at each company was asked about relations between the DP department and user departments generally. Then a user manager, recommended by the DP manager, was asked similar questions.

Although DP managers picked the user managers CW polled, a number of the latter did not hesitate to call DPer insensitive to user needs. Some DP managers called users insensitive to DP needs.

Peaceful Coexistence

However, overall, the 28 interviews suggested that DPer and users have learned methods for peaceful coexistence. In contrast to what was typical a decade ago, user personnel — in departments such as accounting, sales, operations and warehouse — can speak a common language with DPer. Many DP professionals are former users themselves, while some users come from DP backgrounds.

Virtually all 28 survey respondents called communication the key to improving relations between DPer and users. Most said relations were improving in their organization, but a few reported quite the contrary.

Methods by which users express systems needs to the DP department varied from informal phone calls to elaborate formal procedures for generating written specifications. At several organizations, user managers emphasized that users were directing the course of systems development and that DPer were not allowed free rein for experimentation. In some cases, the user manager was the DP manager's boss.

At Charleston Newspapers in Charleston, W. Va., Treasurer David Zinn observed that young additions to the company's accounting section tend to have some computing expertise. Zinn himself is the boss of DP Manager Ralph Sevy and has a technical background. At Charleston Newspapers, therefore, DPer reportedly do not mystify or intimidate users.

"The DP mystique is gone," Distribution Director Pete Spampani told CW from American Sterilizer Co. in Erie, Pa. Since 1970, the user manager explained, American Sterilizer's users have "matured" in understanding what systems can do and how they can handle systems experts. Spampani said his company's DPer and users have "tremendous communication."

Because a large company acquired a Milwaukee manufacturer last year, the manufacturer's DP staff has more reason to meet user needs, according to a user manager there who requested anonymity. Failure to meet user needs, he explained, could lead the parent company to absorb the new

subsidiary's DPer into its own DP department.

Several organizations reached by CW are decentralizing DP resources — a process their user managers said also improves DP staff responsiveness. When users and DPer must work under the same roof at branch sites, cooperation looms important.

At Galaxy Carpet Mills, Inc. in Chatsworth, Ga., Management Information Systems (MIS) Vice-President David Russell declared that systems people should, at some point in their careers, work in user departments "for about a year and then migrate back."

DP Vice-President Clyde Ballard at

Mississippi's Blue Cross/Blue Shield in Jackson agreed. Other DP executives told CW their staffers need more exposure to user realities if applications are to succeed.

Some users employ "structured analysis and design" techniques in communicating what they want from systems. At Washington Water Power Co. in Spokane, Wash., Rate Supervisor Rob Fukai said those techniques have driven out the mystique that once surrounded the utility's data center. Structured analysis and design feature language symbolism, similar to flowcharts, that users can readily learn and which translates well into software metacode because

it averts ambiguity.

Structured communications between users and DPer and mutual insight at Long Beach Naval Shipyard near Los Angeles have allowed the federal installation a solid record of successful applications, according to MIS Director Robert J. Gilmore and a user manager, Chuck Hastings.

Despite the generally upbeat tone of responses to the CW survey, some stories of conflict between DP and user staffs were registered. At an Ohio automotive manufacturer, which requested anonymity, a user manager said DPer consistently tried to mystify users with arcane jargon.

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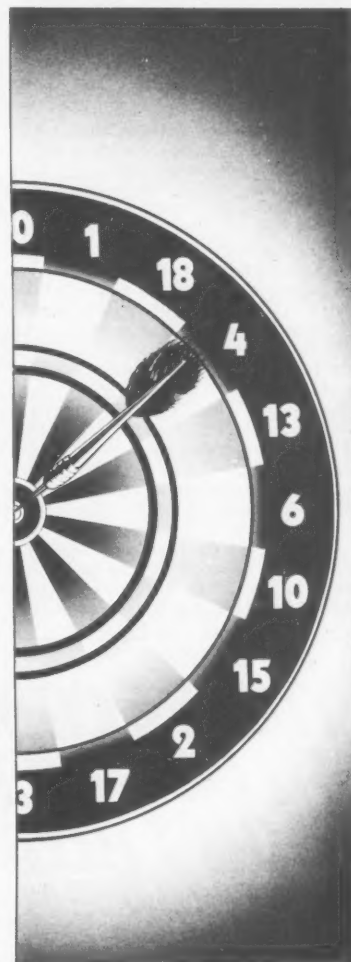
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Only Two Regions Up to Staff

Poll: DP Shops Understaffed in Most Regions

By Marguerite Zientara
CW Staff

In all but two regions of the country, more installations are understaffed than are operating at optimum levels, a geographical breakdown of responses from the recent *Computerworld* survey on DP staffing levels [CW, Aug. 17] indicates.

The survey went out to 500 managers from CW's subscription list from all areas of the country, all sizes of installation and more than a dozen industries. Of the 313 respondents (62.6%) to the survey, only those in the New England and East South Central areas had a majority of installations up to staff.

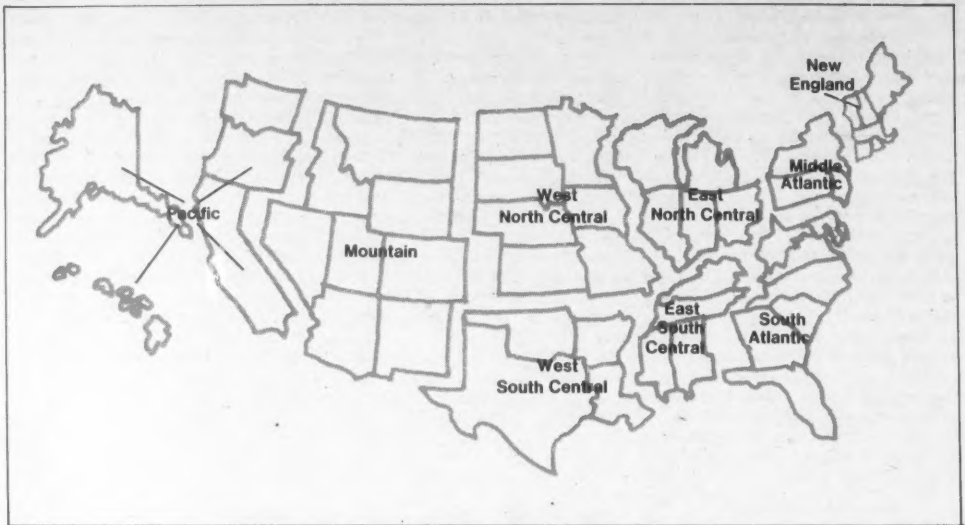
The survey showed overall that 177 respondents (56.5%) were operating below optimum staffing levels, while 131 (41.9%) said they were not operating below preferred levels.

The greatest disparity between managers operating up to and below best levels occurred in the Mountain area. There, 71.4% of the 21 respondents said they were below optimum staff levels and 28.6% indicated they had no problem, for a differential of 42.8%.

Such an overwhelming majority of managers with problems would seem to suggest that the area itself is a contributing factor, possibly stemming from the paucity of attractive, large cities to draw needed talent.

The next largest differential occurred in the Pacific area, where 18 of the 29 respondents (62.1%) said they were below staff and 11 or 37.9% said the opposite, for a difference of 24.2%.

The Middle Atlantic section exhibited a 20% differential (57.5% were below staff, 37.5% were not), while the remaining areas were quite evenly divided between those at and below staff. Remaining differentials ranged from 10.2% in the South At-



Survey's Geographical Breakdown of U.S.

lantic to 15.2% in East North Central.

Of all respondents indicating reasons for leaving given in the last year, in every case the East North Central area overwhelmingly led the pack with the most workers citing "more money," "better advancement," "more interesting job" and "other" reasons.

Fewest Money Complaints

The area that experienced the fewest complaints about money was the West North Central, which also received the fewest cries for a "more interesting job." The East South Central section heard the fewest calls for "better advancement" (shared with West South Central) and "other" reasons and was tied with West North Central for the least need for a "more interesting job."

One result of the regional break-

down could be seen as proof that statistics can distort reality: the East North Central area of the U.S. was ahead of all others in the number of installations that were able to replace "some," "all" and "none" of their workers lost in the last year.

As for how turnover has evolved in different areas, the Middle Atlantic and Pacific sections had the highest rates of respondents who said turnover had increased in the last five years. The East North Central area had the most installations with decreasing turnover, as well as the most in which turnover had remained the same.

The East South Central area had the smallest number of respondents who indicated the problem had increased, while New England and the West South Central area were tied with the number of managers who experi-

enced decreased turnover.

Of the nine industrial categories into which the 313 respondents fell, six included enough respondents to be statistically valid: Manufacturing; Communications, Electric, Gas and Sanitary Services; Wholesale and Retail Trade; Finance, Insurance and Real Estate; Government; and Education.

Of those six categories, all but Wholesale and Retail Trade had a majority of installations operating below optimum staffing levels. Of the 28 respondents in the Wholesale and Retail Trade area, 12 said they were below staff and 15 said they were not.

The category with the greatest disparity between those below and those at optimum staff levels was Government, in which 20 of 27 said they were below staff and only seven said they were not.

Next week: *Suggested Solutions.*

World Conference To Run With Info 81

NEW YORK — Three days of intensive sessions will comprise the first Conference on Information Management for World Companies, which will take place here Oct. 13-15. The World Conference is being held in conjunction with the Information Management Exposition & Conference (Info 81), which runs Oct. 12-15 in the Coliseum.

The "conference within a conference" will address the specialized needs of executives concerned with worldwide information management and global communications networks.

Subjects to be covered include electronic mail, distributed data processing, telecommunications and the emergence of the automated office.

Both events are being sponsored by Clapp & Poliak, Inc. Further details including registration costs and complete session programs on the World Conference, as well as Info 81, are available from Clapp & Poliak at 245 Park Ave., New York, N.Y. 10167.

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All three SyncSorts bear a strong family resemblance. Which is not surprising when you consider that they are all descended from the same technological breakthroughs. In fact, many of SyncSort's "sorting innovations" are now covered by U.S. Patent 4,210,961.

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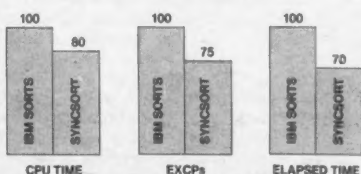
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Chart of the Month:

Performance Comparisons



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Both SBS, Tymnet to Build Wideband Nets...

(Continued from Page 1)

would be operational six months after the company gets a green light from the Federal Communications Commission. Commission approval is possible in as few as 30 days, but objections that would delay the process are likely.

Tymnet plans, within the first year after being certified, to be operating DTS networks in 10 cities, including Chicago, Dallas-Fort Worth, Los Angeles, Philadelphia, Washington, Boston and Houston. Within the following year, Detroit, St. Louis, Pittsburgh, Baltimore and Minneapolis would be among the cities added.

SBS is planning to build DTS facilities in 32 cities. During the first half of 1983, New York, Los Angeles, Chicago, Dallas, and Washington, D.C. would receive the initial systems, followed by Boston and Houston during the second half. In 1984, SBS plans to install DTS networks in nine more metropolitan areas — Philadelphia, Detroit, San Francisco and St. Louis.

Detailed information on proposed rates was not available from either company; however, in an April 6 *Computerworld* story on Tymnet's DTS plans, a high-ranking official said that "today, in a typical city it costs \$200/mo to lease a 9,600 bit/sec local loop from the phone company, plus \$600/mo for each of the

two modems required. By comparison, our microwave system can deliver 256K bit/sec — 25 times more bandwidth — to that same user's site for about half of AT&T's price."

In its application to the Federal Communications Commission, Tymnet pointed out that packet-switching, by bringing down the communications cost of data base access — from \$30 or more per connect hour in the early '70s to around \$3.50 by mid-decade — vastly increased the number of on-line data base users. Initially, the users were a handful of government agencies; today, there are "more than 15,000" located in more than 30 countries.

Second Revolution

DTS now promises to generate a second revolution, one that will have at least as much impact on the user base, Tymnet said.

Today, it's still too expensive for most users to obtain lengthy bibliographies on-line, and getting full texts of desired entries is even more impractical, the company explained. The result is that, even though it takes a computer system only a few minutes to process an on-line query and produce a list of references, the user frequently has to wait days for the post office to deliver the information. After selecting the relevant citations, the user may then have to

wait weeks to see the full text of each.

Tymnet expects DTS to improve this service in three ways:

- Faster, cheaper communications will encourage users to browse on-line through data base menus and key-word vocabularies and develop more precise search queries.
- DTS also will make on-line delivery of bibliographies, instead of mail delivery, feasible for more users.
- Through use of high-speed, high-resolution facsimile, many of the selected references can be supplied in full-text form on-line.

Robert C. Hall, president of SBS, stressed the importance of DTS in

solving the "last-mile" bottleneck that has long beset data communications users — an allusion to the quality and speed limitations imposed by telephone company-provided analog local loops.

"The original SBS concept, that of delivering large communications capacity directly to a customer's premises through the use of easily placed earth stations, was a major step in solving the last-mile barrier for very large businesses," Hall explained. "The addition of digital termination systems will extend that solution to the communications needs of medium and small users."

Magnuson M80/30 Debuts

Magnuson System	M80/30	M80/32	M80/42	M80/43	M80/44
Characteristics					
Relative Performance ¹	16	32	45	54	65
Mips ²	28	50	90	110	111
Memory Size in Bytes (Min-Max)	512K-8M	1M-8M	2M-16M	2M-16M	2M-8M
Purchase Price ² (Memory Size)	\$93,900 (1M)	\$217,100 (4M)	\$324,200 (8M)	\$384,200 (8M)	\$411,200 (8M)
Lease Price (Lease Term)	\$3,420 (2-Year)	\$6,690 (2-Year)	\$9,268 (2-Year)	\$10,756 (2-Year)	\$11,879 (2-Year)
Machine Cycle Time (nsec)	100	100	100	100	100
Channels (Min-Max)	2-6	3-6	3-16	6-16	6-16
Cache (Buffer) Size	None	None	16K	32K	32K
Bus Architecture?	Yes	Yes	Yes	Yes	Yes
Price per 1M Byte of Main Memory ⁴	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000

CW Chart

1. Provided by Magnuson and International Data Corp.
2. Includes processor, console, power supply and all prerequisites.

3. CW estimates.
4. Including hardware and software maintenance.

(Continued from Page 1)

times more often for stand-alone purposes than for distributed processing.

But within about two months, the mix of operating environments is expected to begin shifting gradually in favor of distributed processing users, who will eventually account for about 75% of the M80/30's total sales, the spokesman predicted. An estimated 80% of the machine's future buyers are reportedly expected to use their M80/30-based systems at least partly for interactive, as opposed to batch, processing.

In a minimum configuration, the processor incorporates a 512K-byte main memory (expandable in 512K-byte increments), a 100K byte/sec byte-multiplexer channel, a 2.5M byte/sec block multiplexer channel and an operator's console that can be situated as far as 25 ft away from the rest of the hardware. A maximum configuration holds an 8M-byte main memory and any combination of eight byte-multiplexer or block-multiplexer data channels.

The M80/30's "strategic architecture" reportedly allows the low-end product to be upgraded to any other member of Magnuson's IBM-compatible processor line, which now consists of six models including the M80/31, 42, 43 and 44. With the help of a service engineer, users can ex-

pand the entry-level mainframe in the field by plugging additional processor, memory and I/O boards into the CPU's card cage.

Like its five sister mainframes, the M80/30 boasts a 100 nsec machine cycle time and a 600 nsec memory cycle time. The processor also reportedly executes an average of .3 million instructions per second (Mips), half again the Mips rate of the 4331 Group 1.

When operating under VS1 with an IMS data base, the Magnuson machine's performance edge over its IBM counterpart is especially pronounced, the spokesman claimed.

For the time being, the M80/30 lacks a 3M byte/sec data-streaming feature, which is necessary to support IBM's latest disk systems like the Models 3370 and 3375. But with its 13.3M byte/sec aggregate data rate, the processor could easily be enhanced someday to accommodate the needed data-streaming capability, the spokesman said.

A basic M80/30 configuration sells for \$86,050 or leases for \$3,218/mo under a two-year contract. The monthly leasing fees cover minimum maintenance and local support charges.

Deliveries of the latest Magnuson processor take 30 days from the company's headquarters at 2902 Orchard Park Way, San Jose, Calif. 95134.

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... And Both Planning to Use Same Technology

By Phil Hirsch

CW Washington Bureau

WASHINGTON, D.C. — Tymnet, Inc. and Satellite Business Systems (SBS) plan to use virtually the same technology in the wideband, local distribution networks they last week requested Federal Communications Commission permission to build.

The key element is one or more radio transmitters, located within each metropolitan area where digital termination system (DTS) service is to be provided. Tymnet refers to this facility as a Digital Termination Nodal Station (DTNS).

The DTNS communicates with users up to six miles away via microwave. Alternatively, or in addition, a local cable TV network can be used, or coaxial cable can be leased from the phone company. Interconnection with the existing local telephone network is also possible, although this reduces the maximum bit rate.

Three Antennas

If microwave local distribution channels are used, the DTNS has three directional antennas, each serving a 120° sector of the surrounding area. A pair of microwave channels, each capable of transmitting data at 1.8M bit/sec, serves each sector.

One channel, utilizing a time-division multiplex (TDM) allocation scheme, broadcasts uniquely addressed messages to all the stations in its sector; the other, employing time-division multiple access (TDMA), provides a shared path for customers to send data to the DTNS.

At the user's end of this communications path is a Digital Termination User Station (Dtus). This receives the

1.8M bit/sec signal from the DTNS through a parabolic reflector, two feet in diameter, typically mounted on the roof of the user's building or in an office window opening.

The reflector is connected to one or more data terminals through a number of intermediate devices. They convert the frequency and speed of the received signal to acceptable levels and also demultiplex the data, which can be addressed uniquely to each of a number of receiving devices or computer processes at the same site. Data transmitted from the Dtus goes through essentially this same process in reverse, using the same components.

Both Tymnet and SBS plan to use their existing long-haul networks to

interconnect the new DTS facilities. Tymnet, which now leases intercity capacity from other carriers, plans to build its own microwave facilities between some cities relatively close to each other, where it plans to offer DTS.

One advantage of this scheme is that existing customers of either company will be able to access, and be accessed by, DTS users. This will allow terminals employing widely different speeds, information codes, and protocols to talk to each other.

Tymnet and SBS, in collaboration with others, are now testing a transcontinental data communications connection between New York and San Francisco.

A wideband SBS satellite intercity

channel is connected to a cable TV local distribution system in New York and to a combination of microwave and cable TV in San Francisco. The latter facilities provide what amounts to digital termination systems.

SBS said in its application to the Federal Communications Commission that, although much has been learned from the test so far, "much remains to be learned in the way of design, installation and operation of a DTS network ... It is anticipated that the test, prior to its completion, will disclose a great deal more about system design and service feature requirements that will materially assist ... in developing the most efficient design of DTS facilities."

ASC Head Raps Data Flow Curbs

DENVER — Efforts to restrict communication across international borders were sharply criticized here last week by Emanuel Fthenakis, chairman of the American Satellite Co. (ASC).

His attack was directed at both developed and underdeveloped nations. The latter, he said, by imposing transborder data flow restrictions on multinational companies, are hurting themselves as well as the companies. "Business communication ... is crucial ... to the efforts of Third World nations to leapfrog to a position of parity with the developed countries."

Within the "western world," Fthenakis added, there are more "artificial" barriers. "If my satellite can see both South and North America, for example, I am not allowed to establish the communications link. Instead, I must interrupt it at our borders and hand it over to some other body — most likely a monopolistic entity — for a double hop. This only causes artificially higher costs and reduced performance."

The American Satellite Co. executive, who spoke here at a satellite users' conference, applauded recent efforts, of "some" United Nations members to fight transborder data flow restrictions.

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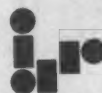
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Jury in First B800 Trial Finds in Favor of Burroughs

(Continued from Page 1)

lems and eventual reasons for refusing to continue payments centered on its B800 system, the construction firm's difficulties with Burroughs have deeper system roots, according to Conover. Burroughs first recommended a B80 system when the firm first issued a request for proposals to various vendors for a system to handle its corporate reporting needs.

Williams Industries accepted Burroughs' proposal in January 1979 and asked that a machine be delivered by May 1. The computer was to be used by the firm to prepare end-of-year reports as well as to handle accounts receivable, accounts payable and other business data.

However, Burroughs reportedly did not make the user's installation deadline. When the machine had still not been delivered by August 1979, Williams insisted in writing that Burroughs install some sort of a computer system to handle the firm's reporting duties, Conover said.

Burroughs then delivered a "demonstration model" B80 and Williams began building its data files. "Within a very short period of time, a matter of weeks actually, it became pretty obvious to us that the B80 simply could not meet our existing requirements," Conover said.

Burroughs Recommendation

After making "a reasonable effort to try and make it work," Burroughs recommended abandoning the B80 and installing a larger B800 system. Williams accepted Burroughs' recommendation and the B800 was installed in the spring of 1980. However, instead of solving the firm's processing problems, the B800 created an assortment of new difficulties, Conover contended.

In its defense, Williams claimed that during the period from April to September 1980, Burroughs made more than 100 service calls on the B800 hardware. "I imagine they damn near replaced every board and every item in that machine," Conover stated in an interview last week.

The firm's countersuit noted that in

November 1980, Conover and an associate met with a Burroughs' district manager to discuss their problems with the B800 and that both parties signed an agreement stating that Williams would not authorize payment until the B800 equipment became operational.

About a month later, the firm notified Burroughs that since the system was still not running properly, "we would have to consider other alternatives, including replacing the system," Conover said.

'Last Opportunity'

Several weeks later, the firm allegedly offered Burroughs a "last opportunity" to fix its B800 if the vendor would agree to commit all its resources and pay for any additional financing costs. (At the time, the leasing company, recommended by Burroughs, that was handling the Williams account wanted 10% more money than was previously negotiated, Conover said.)

The construction firm also wanted Burroughs to agree that if it failed to satisfy the company's computing requirements, it would be responsible for any damages that occurred.

Burroughs allegedly refused and Williams rejected the B800. The vendor subsequently brought suit against the firm for nonpayment.

Williams is seeking to appeal the court's decision on the grounds that several legal errors were committed during the trial, including that the judge may have misrepresented the facts of the case during his final instructions to the jury, Conover said.

At press time, no date had been set for a hearing.

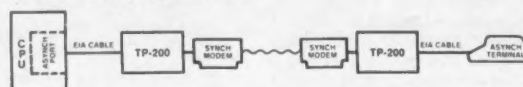
Corrections

Sysed's command-level course in CICS [CW, Aug. 17] is a five-day, not a one-day, course.

The correct address of NBI ["WP Workstations Debut at Syntopican," CW, July 20] is 1695 38th St., Boulder, Colo. 80301.

TP-200 SYNCH/ASYNCH CONVERTER

The TP-200 Synch/Asynch Converter allows asynchronous data terminals to be used on synchronous data links. The device acts as an elastic buffer to "match" the data rate of the terminal to that of the synchronous data link.



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Justice Repeats Divestiture Request

By Phil Hirsch

CW Washington Bureau

WASHINGTON, D.C. — The Justice Department last week repeated its request for divestiture of AT&T in the face of earlier statements by key officials of the Reagan administration that they are willing to settle for much less.

The Justice Department's position was stated in a response to AT&T's call for dismissal of the government's nearly eight-year-old antitrust suit. "Nothing short of the structural relief requested by the U.S. in this case will eliminate AT&T's opportunities and incentives to continue in that course unabated," Justice said.

Earlier, William Baxter, assistant attorney general for antitrust, told the Senate Judiciary Committee the government would willingly drop the suit if Congress adds two amendments to pending telecommunications legislation. Baxter said the two amendments would protect the phone company's customers and competitors against the effects of surreptitious cross-subsidies, a claim several of the competitors heatedly contest. Neither change would require divestiture.

Users Can Now Supply Own Dataspeed Cables

WASHINGTON, D.C. — Future users of AT&T's Dataspeed 4540 terminal will be able to save up to \$175 in installation charges by supplying their own connecting cables instead of getting them from the phone company.

A tariff amendment filed by the phone company earlier this month and scheduled to become effective Nov. 5 allows use of customer-provided cable provided it interconnects all of the devices associated with the controller, consists of shielded standard serial interface cable and is installed prior to the date of the Dataspeed 4540 installation.

Furthermore, AT&T "will not modify Dataspeed 4540 equipment to accommodate the connection," nor does it represent that transmission will be satisfactory. Future moves or arrangements involving the cable become the customer's responsibility, and he also becomes liable for a maintenance or service charge if trouble arises and a telephone company technician finds it is caused by the customer-provided cable.

If AT&T supplies the cable, it charges \$175 for the first 100 feet, or fraction thereof, between a Dataspeed 4540 controller and each device connected to it. For each additional 100 feet, or fraction, the charge is \$125.

Dial-Up Standard Nears Completion

WASHINGTON, D.C. — Work on an interface standard that would impact data communications users transmitting over the public switched telephone network is nearing completion at the Electronic Industries Association (EIA), headquartered here.

Known as "PN-1373: Interface Between Data Circuit-Terminating Equipment (DCE) and the Public

Switched Telephone Network," the standard will tell suppliers of modems and other DCE what technical requirements they have to meet to transmit through the dial-up telephone network. PN-1373 is being developed by EIA's TR30.3 subcommittee, chaired by John M. Skaug, a senior staff engineer at GTE Service Corp. Skaug said he expects the standard to be released for industry comment in January and "hopes" for publication the following April.

PN-1373 includes a section that deals with echo control and acknowledgement delay on satellite circuits. The extra transmission delay inherent in satellite transmission means that many dial-up modems now in use (Models 201c, 202, and 208) will have to be adjusted and in some cases may have to be replaced.

Skaug reported that the section of PN-1372 dealing with these matters requires further drafting and may be published as a supplement to, rather than as a part of, the original standard.

IDCMA Exec Attacks Wiring Deregulation

WASHINGTON, D.C. — Charles Johnson, vice-president of the Independent Data Communications Manufacturers Association (IDCMA), does not want inside wiring deregulated.

Unless S. 898, the Senate's pending rewrite of the Communications Act of 1934, is amended accordingly, AT&T — through the "fully separated affiliate" (FSA) established by the bill — could compel data communications users to purchase terminals "manufactured or supplied by the FSA or an affiliate," Johnson contended in a letter to the bill's chief sponsor, Sen. Robert Packwood (R-Ore.).

Johnson, who is also president of General Datacomm Industries, Inc., a major modem manufacturer, ex-

plained that "because the FSA will not be subject to Federal Communications Commission regulation, it will have no obligation to afford reasonable, nondiscriminatory interconnection" of independently manufactured terminal equipment.

Deregulating inside wiring would

also "permit nonvoice services to be cross-subsidized by voice services," Johnson added. He pointed out that "if AT&T's inside wiring investment is transferred to the FSA, the associated maintenance and field service personnel will likewise be transferred . . . The FSA would then have the ability to subsidize its unregulated activities as a result of its provision, maintenance and control of a bottleneck facility."

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System 80 Gets Memory Boost

BLUE BELL, Pa. — Sperry Univac has expanded the main memory capacity of its System 80 from 1M byte to 4M bytes. The memory expansion is being offered in 512K-byte increments.

The enhancement is available on

both the Model 3 and Model 5 processors.

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Analyst's \$20,000 'Times' Ad Slams MX Missile Program

By Brad Schultz

CW New York Bureau

NEW YORK — Senior data base analyst Francis Hsu made an unusual investment of 10 years' savings recently.

He did not spend the nearly \$20,000 on stocks, bonds or real estate. Instead, the former Vietnam War infantryman ran a full-page ad in the Sunday *New York Times*. The Aug. 2 ad displayed Hsu's essay on why, in his opinion, computer technology makes the MX missile program pointless.

Hsu works for a large New Jersey insurance company. Born on mainland China, he has studied theories of warfare in his spare time while developing as a DP professional.

Hsu's essay told *Times* readers that ordinary people can now afford to buy computers and remotely pro-

gram them, over the nation's ubiquitous telephone network, to detonate explosives or illicitly tap electronic funds transfer (EFT) lines. Terrorists, foreign agents, gangsters and crackpots could devastate a city, a region, even a nation in this way, he told *Computerworld* recently.

EFT War

Donn Parker, an SRI International, Inc. consultant who lectures widely on computer abuse, has presented similar views at international meetings of communications experts during the past year. Parker, who advises the federal government on computer security, has said that "EFT war" is becoming more credible than thermonuclear war as a way to destroy countries [CW, Nov. 3].

Parker estimated a \$160 billion EFT heist would destroy the U.S. economy. Equivalent to 0.4% of the assets turned over by U.S. banks in 1978, \$160 billion could be diverted via EFT in seconds or gradually over months.

According to the essay Hsu ran as a Sunday *Times* ad, "democratization" of computing resources among the public — proliferation of computing resources among the public — has made intercontinental ballistic missiles (ICBM) obsolete tools for war.

Another superpower is unlikely to launch ICBM against the U.S. because the U.S. clearly can reciprocate, annihilating the attacker, Hsu asserted. In contrast, the victim of an EFT attack or of a computerized barrage of explosives may not have the means of counterattacking in the same medium. The victim may not even know the attacker's identity.

According to Hsu, the U.S. should concentrate efforts to defend national security on the jeopardies posed by computer technology. The MX missile program and other efforts to extend the nation's capacity for thermonuclear warfare reflect outmoded thinking, Hsu maintained.

MX advocates resemble the French generals who ignored air power by digging the Maginot line or cavalry officers in previous wars who charged against machine gun fire. Hsu said he attempted to interest the federal government in his independent research without success, grew frustrated and hit on the idea for the *Times* ad "in a dream."

He can be reached at 16 Coventry Circle, Piscataway, N.J. 08850.

Forum to Eye Capacity Plans

SUNNYVALE, Calif. — A three-day forum for DP personnel dealing with the challenge of finding an integrated approach to capacity management will be presented by the Education Services Division of Boole & Babbage, Inc.

The forum is slated for Sept. 2-4 in Santa Clara, Calif.

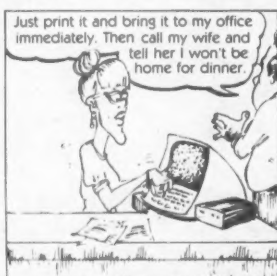
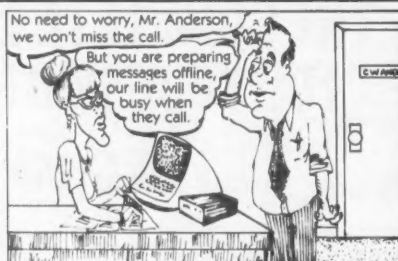
The forum was designed for DP directors, managers and staff members who are involved in managing and planning current and future data center operations. Topics include organizational capacity management, organizational needs and data center capacity planning, establishing operation standards, work load characterization and more.

The registration fee is \$695, Boole & Babbage said from 510 Oakmead Parkway, Sunnyvale, Calif. 94086.

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GREENWICH, Conn. — Enterprise Information Systems, Inc. is offering a 2½-day forum on telecommunications, micro information systems and IBM's 4300 and 8100 series in Phoenix Oct. 21-23.

The forum will feature sessions on "Information Systems for the 1980s," "Telecommunications," "Office-Vendor Perspectives and Office-User Perspectives for the 1980s" and "Micro Information Systems for the 1980s."

The registration fee is \$675. Enterprise can be reached through P.O. Box 1154, Greenwich, Conn. 06830.

Labor Department Decision

Maintenance Exempted From Contract Act

By Jake Kirchner

CW Washington Bureau
WASHINGTON, D.C. — The Labor Department has decided to exempt maintenance contracts for federal DP installations from a proposed mandatory minimum wage system.

Numerous DP firms and federal agencies had argued the wage rules would threaten service availability for government facilities, including some vital to national security.

The Labor Department proposal, issued Aug. 14, would exempt "the maintenance or repair of automated data processing equipment, including office information systems, from provisions of the Service Contract Act."

Extension of the 1965 law's coverage to contracts for federal DP installations, proposed during the Carter administration, had caused several major vendors to refuse government contracts. The firms argued the law would destroy their merit pay scales, increase costs and hinder their commercial service operations.

That position, backed by strong lobbying here by the Computer and Business Equipment Manufacturers Association, was ultimately adopted by the General Services Administration, the federal procurement agency, which feared degradation of government DP capabilities.

GAO Report

The General Accounting Office (GAO), the auditing branch of Congress, also came out against the Service Contract Act extensions, arguing in recent reports that the law, designed to protect service workers from "wage busting" practices, is not appropriate to high-technology industries.

In a report issued last fall, GAO said a number of federal installations had experienced problems contracting for DP maintenance because vendors did not want to honor the wage systems mandated by the contract law. The GAO concluded that applying the statute to high-technology industries seriously jeopardized national security [CW, Oct. 13].

After what it termed "a thorough review," the department is now proposing to exempt federal DP systems from the law. Additional exemptions were proposed for the maintenance and repair of scientific and medical apparatus having DP or other high-technology "as an essential element" and for the maintenance and repair of office and business machines

when performed by the equipment manufacturer or supplier.

Without the exemptions, Labor said, "there is likely to be serious adverse impact on the operations of the government, such as the potential curtailment of crucial programs and services, many of which are critical to national defense and security."

The "preponderance" of affected contracts, according to Labor, are for commercial products and services "at standard commercial prices." Most of the contracts call for only "sporadic and intermittent" maintenance of an "on-call nature."

Because the contracts are not principally for service work, the Service Contract

Act should not be applied to them, Labor said in the Aug. 14 statement.

Addressing the service employees themselves, the Labor proposal said the technicians "are not principally assigned to federal government contract work, but perform such work as an integral part of their day-to-day duties of servicing equip-

ment in commercial establishments."

Besides benefiting high-technology vendors and federal installations seeking maintenance agreements, Labor said, its proposed package of amendments to and exemptions from the Service Contract Act would save contractors and the government \$240 million annually.

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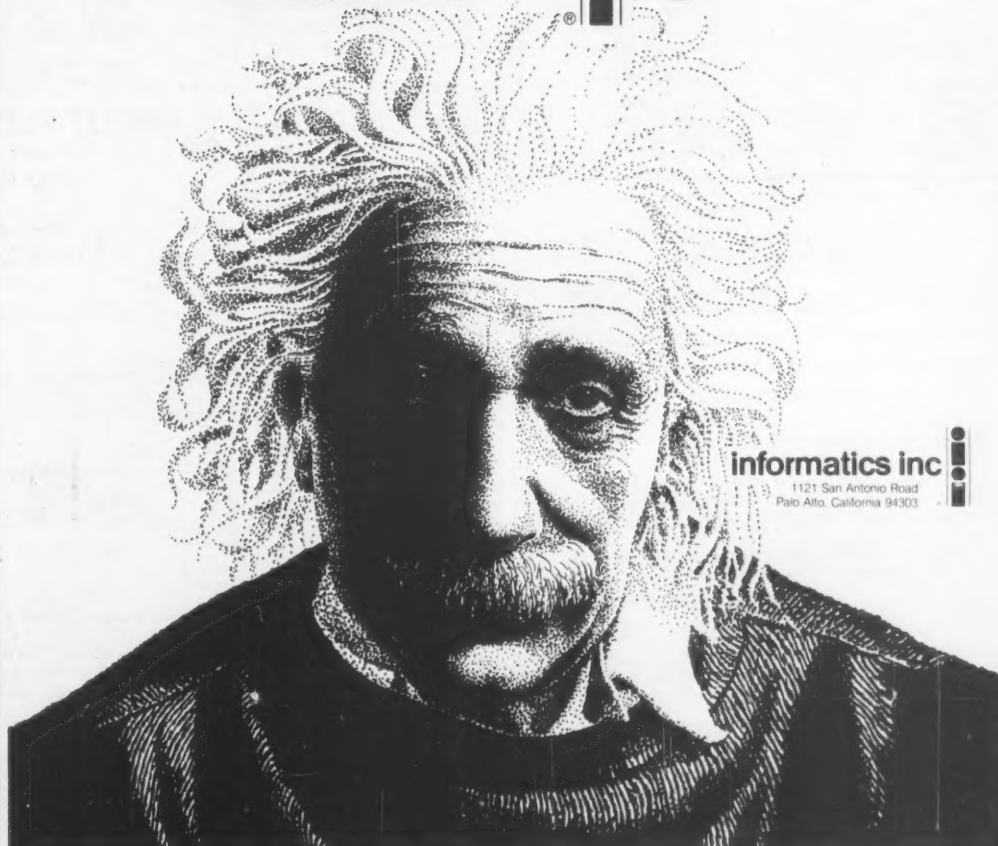
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Managers on the Move

JAMES S. SARNOVSKY has been named manager of information systems development for Fruehauf Corp., headquartered in Detroit. He will now be responsible for the development and support of all computerized business applications for the Fruehauf operations served by the corporate management information systems

department.

A nine-year veteran with Fruehauf, Sarnovsky has been computer technology manager since 1978. Prior to that, he served as manager of application systems and as data base administrator for the firm's Kelsey-Hayes subsidiary.

Sarnovsky received his bachelor's degree from Law-

rence Institute of Technology and an MBA from Eastern Michigan University.

WALTER LAWRENCE COE, assistant manager of the data processing department at Germantown Savings Bank (GSB), has been promoted to vice-president.

Coe came to GSB in 1955 as a teller and was promoted successively to assistant branch manager, programmer, systems programmer, and programming manager.

He attended Temple University and Philadelphia College of Textiles & Sciences and is a graduate of the School of Savings Banking.

HOWARD W. BRYANT has been promoted to manager of systems planning and research in the management information systems (MIS) department of Blue Cross and Blue Shield United of Wisconsin, based in Milwaukee.

In 1978, Bryant joined Blue Cross as manager of claims systems in MIS and was named senior consultant in 1979. Prior to joining Blue Cross, he was manager of systems at the Wisconsin Physicians Service in Madison, Wis.

Bryant is a 1962 graduate of the University of Wisconsin where he earned a bachelor of science degree in geology.

GERRALD REED, formerly the director of system and procedure development for the Topeka, Kan. division of Volume Shoe Corp., was recently promoted to director of systems planning for M. Burnstein & Sons, a division of Volume. Reed is also an assistant vice-president of Volume.

In his new post with Burnstein, which is headquartered in Harahan, La., Reed will be responsible for the implementation of the division's computer system. Prior to working with Volume, Reed was with Sperry Corp. and Capitol Federal Savings & Loan Association.

Reed graduated from Washburn University in Topeka, Kan. with a B.B.A. degree in business. He has also worked as an instructor for the Dale Carnegie Institute.

JAMES W. HODDLE has been named vice-president of remote center operations for City National Bank's computer center in San Diego where he will be responsible for bank data processing.

Huddle began his banking career with City National Bank in branch operations in 1962. He later served seven years as vice-president and manager of computer opera-



James S. Sarnovsky



Walter L. Coe



Howard W. Bryant



Gerald Reed

tions for the bank's DP division.

Reed attended the University of Southern California where he received a B.S. degree in finance.

JAMES LOCHEN has been appointed associate director of data processing at Ancilla

Domini Health Services, Inc. of Des Plaines, Ill.

Lochen worked as assistant director of DP for the University of Chicago Medical Center prior to joining Ancilla. He will now direct the operational elements of the Ancilla data processing system.

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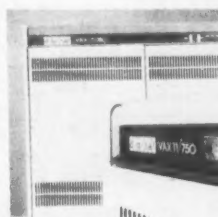
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Judge Half Seriously Suggests Computers Decide Child Custody

By Bruce Hoard
CW Staff

BUTLER, Pa. — Computers could be used to resolve child custody battles, according to Judge George Kiester, senior judge in Pennsylvania's 50th judicial district here.

That admittedly "radical proposal" was one of many prospective changes to current custody laws Kiester recently submitted in a nine-page "protest" he sent to the Pennsylvania State Supreme Court Justice, president judge of the State Superior Court and Pittsburgh media.

Emphasizing that he wants to protect children from long and painful custody battles, he claimed the different values held by Supreme Court and Superior Court judges have created the need for a more standardized approach to custody cases.

"If a proposal for a simplistic approach to custody litigation is unacceptable to the judiciary, I suggest that a computer be programmed to decide who obtains custody," he wrote.

"The decision makers would supply the computer with the probable answers to a myriad combination of factors in custody action. The attorney would use the computer to advise the client of the probable result in the dispute.

"If a hearing was required, the issues would be well defined with the attorneys presenting facts on key factors and arguing over the points to be awarded on each factor. The hearing judge, like the attorney, would ask the computer to make a decision."

Custody Factors

Some of the factors Kiester would include in a computer custody program include the age of the child and parents, morals, drugs, employment status, sexuality, religion and preference of the child.

Asked if he knew of any precedents for such an action, he replied, "Oh no, none whatsoever. Actually, I was pulling the leg of the Supreme Court."

Does that mean he is not serious about the computer proposal? "I'm half serious. I think it should be considered." The chances of that happening depend on legislative action at the state level and he said no lawmakers were interested at this time.

Kiester has taken iconoclastic positions on other issues

in the past. He once ruled that teachers do not have a right to strike and was overruled by the state Supreme Court on a technicality.

Another time, he sought to curb drunken driving by confiscating the vehicles of offenders.

The judge refused to speculate on the possibility of establishing a voluntary system whereby the computer could be employed if all parties concerned agreed.

It would take a lot of time and money, he allowed, adding that he did not know how much. It would be a good idea for reporters to study the inconsistencies of past cases and suggest guidelines for the computer program, he said.

Kiester was reluctant to prescribe computers as arbiters in other legal disputes such as jury trials. However, he did say there were similarities between criminal and custody cases: In both situations, the rights of participants may easily be violated.

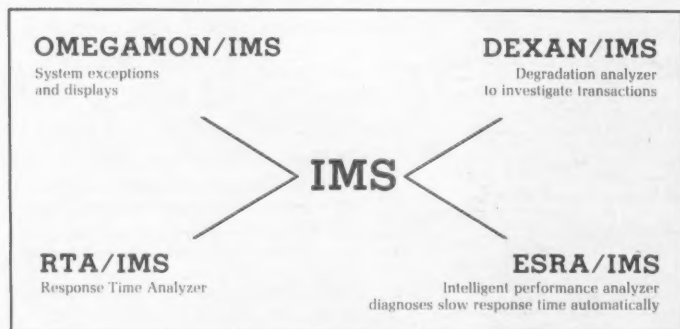
Could a computer do a better job of deciding custody than he could? "I'm interested in certainty," he declared. "I'm interested in bringing an end to litigation."

The federal government is currently pondering a controversial and voluntary plan to use computers in matching adoptable children with suitable parents. Introduced by Sen. Carl Levin (D-Mich.), the proposed bill is encountering heavy opposition.

"There could be merit to it," Kiester said of the idea. "But it would be expensive."

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Plan to Use Prison Labor To Make CDC Peripherals Draws Fire from Unions

By Bill Laberis
CW Staff

STILLWATER, Minn. — A plan to use prison labor to manufacture computer peripherals has drawn fire from local union officials, who may fight the program in court.

Developed by Control Data Corp., the plan calls for the employment of up to 200 inmates at Stillwater Prison here on a job-shop basis. CDC would pay workers from \$3.35 to \$4 per hour for assembly operations.

"I don't think it's a good idea at all, and I am not sure we will agree to such a program," according to Jack Jorgensen, president of the Joint Council of Minnesota of the International Brotherhood of Teamsters.

The Teamsters have organized the assembly workers at the Honeywell, Inc. plants in the Minneapolis-St. Paul area 30 miles west of the prison; the minimum hourly wage at the Honeywell plants for low-level assembly work, exclusive of benefits, is more than double what CDC is planning to pay the inmates at Stillwater.

"It's a subwage they're wanting to pay, related only to the community where the prison is located," Jorgensen said. "We could be looking at all avenues of action to stop it, from court action to governmental pressure. We're not sure just now."

But to what extent the Teamsters or any other union can stop the program, scheduled to begin early next month, is unclear.

No Major Obstacles

Thomas Grogan, director of correctional industries in Minnesota, said the state had agreed with federal officials to notify and consult with local unions concerning the program, but he did not think union approval was prerequisite to starting operations.

"So far we have seen no indications of any major obstacles from organized labor," Grogan said.

A meeting was held Aug. 14 between officials of the corrections department and the union locals to air any objections to the program. The Teamsters' Jorgensen said he did not attend the meeting because he was preoccupied with a strike at another union shop, and corrections department officials who were present at the meeting were out of town when contacted about the results of it.

As it stands, the Stillwater plan calls for state corrections personnel to operate the assembly line in an existing building at the prison, with CDC providing the raw materials, equipment and training, a corrections department spokesman said.

A 1935 federal statute prohibits inmates from making products to be used in interstate commerce. But the federal Law Enforcement Assistance Administration (LEAA) began waiving the restrictions in 1978 for certain government-approved prison projects of which the Stillwater plan is one. It is believed to be the first such LEAA-approved plan involving the manufacture of computer components.

The inmate workers, all of whom must be within 18 months of release from prison, will produce disk drive components for Magnetic Peripherals, Inc., a CDC subsidiary that is also partly owned by Honeywell.

Half of the inmates' salaries will be held in a mandatory savings plan, payable upon release. State and federal taxes will be deducted, and the prisoners will be "encouraged" to pay child support and restitution for their crimes, according to Grogan.

In lieu of rent and utilities payments, CDC will pay an undisclosed per-production unit cost to the prison system, Grogan said. However, the company will not pay out contributions to the usual employee benefits packages, such as medical and dental insurance and sick and vacation leave. These contributions cost about 35% over and above the pay of an employee on the low end of the salary scale.

The medical and other related benefits will instead be provided by the state through the prison system. Grogan said this arrangement will not necessarily give CDC an unfair competitive advantage because of the nature of prison industries.

Financial Risk

"There are a number of disadvantages and risks to Control Data in coming in here with this type of operation," Grogan said. "There are occasional unannounced work stoppages, enforced lock-ups, foggy day lockups when we can't see the inmates to watch over and a work force with a less than stable work history. They [CDC] are certainly taking a financial risk coming in," Grogan added that CDC will provide a "considerable investment in training the inmates" and that the company has said it will not lay off any other nonprison assemblers as a result of the Stillwater operation.

Teamsters local president Bill Tyler, who said the prevailing minimum wage for assembly work in the Minneapolis area is \$7.56 per hour, did not agree with Grogan.

"The thing I really dislike is that, if this is going to be a trend in industry to get cheap labor, then it's a hell of a reward for people who don't break the law," he said. "I don't like it."

ACM Forms Group On Security, Audit

NEW YORK — The Association for Computing Machinery (ACM) has chartered a Special Interest Group on Security, Audit and Control (Sigsec).

The group is concerned with control of access to resources, verification of identity, risk analysis, testing and certification of applications and other similar subjects. The group will produce a newsletter and possibly conferences and workshops.

Annual dues for ACM members are \$8. Student members must pay \$4 to belong and nonmembers will be assessed \$18, ACM said from 1133 Ave. of the Americas, New York, N.Y. 10036.

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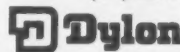
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Speed Isn't Everything

Benchmarks in Perspective: A Closer Look

By Hillel Segal
Special to CW

During the past several months, we have examined the results of benchmark tests conducted by the Association of Computer Users (ACU) on six computers in the \$25,000 to \$50,000 price range. At this point, halfway through the 12-system field, it is a good time to put the results into perspective.

For each computer, we have reported two times. To get these figures, the systems were run in foreground/background mode, with an order entry program running at the terminals while a CPU-intensive program was also executing. Two timings were then made: the length of time it took the CPU-intensive program to execute a loop 3,000 times and the time it took the order entry program to respond to 12 input lines and display a prompt.

Shown in the Scorebox are results for these two tests on the six systems we have looked at thus far. Keep in mind that other tests were also run on the computers, which are discussed in the complete benchmark reports issued by ACU.

It is also wise to note that some computers were tested in Basic, while others were in some cases using Cobol or Dibil. The choice of language was up to the manufacturer, with the only exception being that assembly language was not allowed.

Significant Factors

But the big point I want to make here is that the benchmark test results, while in and of themselves quite significant, are not the be-all and end-all in computer comparisons. Speed is not everything. In practice, a number of other factors come into play when purchasing a computer system and we do not want to minimize the importance of them.

For example, does the system offer all the necessary hardware? How expandable is it? Does it fit in with existing systems? Is all the software that is needed available? How good is the service and support that comes with the equipment? These and other questions are appropriate.

Speed is important, but it is only one consideration. The times obtained during benchmark test are an indication of the relative speed of the systems when put under similar demands. To understand them fully, it is necessary to look at the tests involved and note the operating systems and languages in use in the particular cases.

Differences in timing of a fraction of a second — in some instances, even a couple of seconds or more — should be considered insignificant.

One interesting outcome of the benchmark tests was that the two fastest machines (Hewlett-Packard Co.'s and Wang Laboratories, Inc.'s) in the first half of the group both used an interpretive version of Basic.

It is surprising this goes against the common-sense assumption that compiler-based systems execute faster than interpreter systems.

We have seen considerable variation in the types of operating sys-

tems and languages offered. The operating systems fall basically into three classes: menu-driven systems, line-oriented systems and operating systems that are built into a programming language. Each type has its own particular advantages and disadvantages.

Both the IBM and Texas Instruments, Inc. operating systems follow a menu-driven approach.

By this we mean that the user is led through a hierarchical question/answer session until the desired system command is found. This makes it very easy for the novice to become acquainted with the system. More experienced users can bypass this step-by-step process on some systems by simply entering the appropriate command.

Line-oriented operating systems are exemplified by Digital Equipment Corp. and Alpha Micro Systems, Inc. A line-oriented system is one in which commands are entered sequentially line by line. The drawback of line-oriented systems is that in complex systems it is often difficult at first to know which command you want.

However, most line-oriented systems (including DEC's and Alpha Micro's) offer the advantage of command files. A command file is a file composed of system commands that are all executed when the name of the file is issued.

Two systems — Wang's and Hewlett-Packard's — have their operating systems built into their Basic programming languages. All system commands are Basic commands or functions.

These systems avoid the lengthy

and often complex process of editing, compiling, linking and finally executing programs.

However, this simplicity is not free. It comes at the expense of software versatility. These two systems are able to have a built-in operating system only because Basic is the only language offered.

Texas Instruments has the most versatile software package, providing six programming languages. Alpha Micro and IBM are next in line, with three languages each (on the systems tested). DEC, Wang and HP offered only one programming language each.

Expandability Question

When shopping for a computer system, one of the most important things to look for is expandability. Naturally, you want to know if a particular system can expand along with the organization or if it will be outgrown within a couple of years.

Three physical limitations that are particularly important are maximum main memory, maximum on-line storage capacity and maximum number of terminals.

Of the six systems tested, the TI Model 4 offers the greatest central memory capacity — 2,048K bytes of error-correcting memory. The Alpha Micro is next with 1,024K bytes, followed by the HP 250 with 576K bytes of parity memory. The other three systems tested so far each offer a maximum of 256K bytes.

In terms of secondary storage, the main limiting factor in most of the systems is the number of card slots available for disk controller boards. The HP 250 offered a maximum of

53M bytes. In contrast, the Alpha Micro system can support as much as 2,400M bytes of on-line storage. Other systems in the group offered capacities ranging from 224- to 676M bytes.

IBM Terminals

IBM led the six-system group in the number of terminals that can be attached, but benchmark testers found it was not easy to use them all at once for the order entry problem. They ended up concluding that "practical limitations" were more important than the number of actual hardware ports that could be connected.

According to company literature, 256 I/O devices can be connected to the Series/1 — far more than any realistic application would permit in use at the same time.

The TI Model 4 was next in line with a maximum of 39 terminals, followed by the Alpha Micro with 24. The Wang 2200MVP was speeded at 12 terminals, while the DEC system has a maximum of eight. Only six terminals could be used with the HP 250.

Documentation and Service

Two factors often overlooked when one buys a system, but which later become all-important, are documentation and service.

Our consultants found the documentation for the six systems to be quite satisfactory, in general. HP and Alpha Micro seemed to have the best manuals, while IBM's manuals were complete, but somewhat complex.

Service varies greatly from company to company and from system to system. The greatest variation occurs among companies whose policy is to let their OEMs handle all service. In these cases, the service may be either excellent or terrible, depending on the particular OEM.

In instances where manufacturers handle their own service, support is likely to be much more consistent. Users rated DEC's service, for example, as consistently good. Likewise, IBM's hardware service was said to be excellent, although some customers said their software service left a lot to be desired.

In general, all six systems are reasonable buys. Some offer speed and simplicity at the expense of versatility. Others offer great software and hardware flexibility, but are slower and more complex. The trick is to pick a system that meets your particular needs.

The benchmark reports, by comparing the features and performance of the most important computers in a given price range, make selecting a system much easier. To the extent that speed is a consideration in the choice, the benchmark test times for typical applications deserve notice.

Hillel Segal is president of the Association of Computer Users, a nonprofit association with members in the U.S., Canada and several other foreign countries. A package of information about the Association of Computer Users is available from the group at P.O. Box 9003, Boulder, Colo. 80301.

BENCHMARK RESULTS

Test E-4

	CPU-Intensive (Run in Background)	Order Entry Response Time (8 Terminals Simultaneously)
	Time	Time
Wang 2200MVP	16.4 Sec	4.6 Sec
IBM Series/1	*	*
TI DS990 Model 4	135.2 Sec**	4.3 Sec**
Hewlett-Packard 250	***	***
DEC Datasystem 355	84.1 Sec	16.1 Sec
Alpha Micro AM-100T	45.2 Sec	5.7 Sec

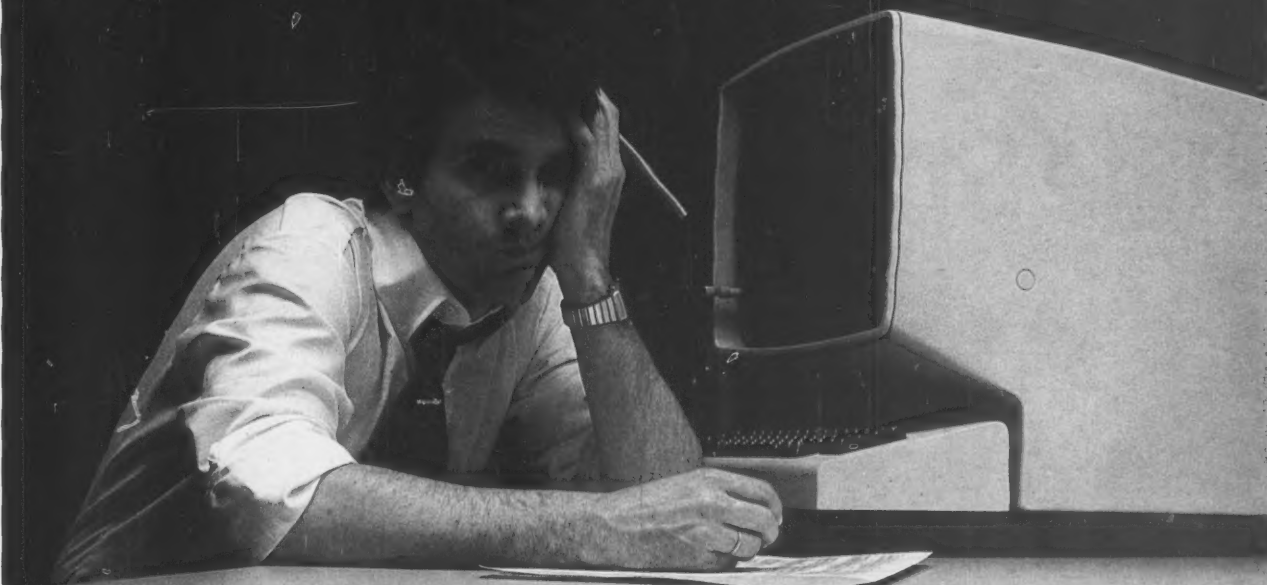
* Programs could not be run properly due to a loss of characters in the order entry processing.

** For programs run in Cobol; the respective times for Pascal are 68.1 sec and 3.9 sec.

*** The 8-terminal test could not be run, as a maximum of 5 terminals can be connected. With 4 terminals, times were 47.6 sec for the CPU test, and 2.3 sec for the order entry test.

This is the 35th in a series of articles giving the highlights of benchmark tests conducted on popular, small computer systems. The full reports were originally published by the Association of Computer Users, a 4,000-member nonprofit organization.

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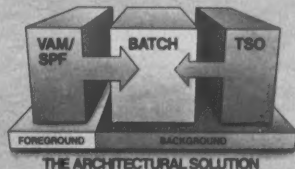
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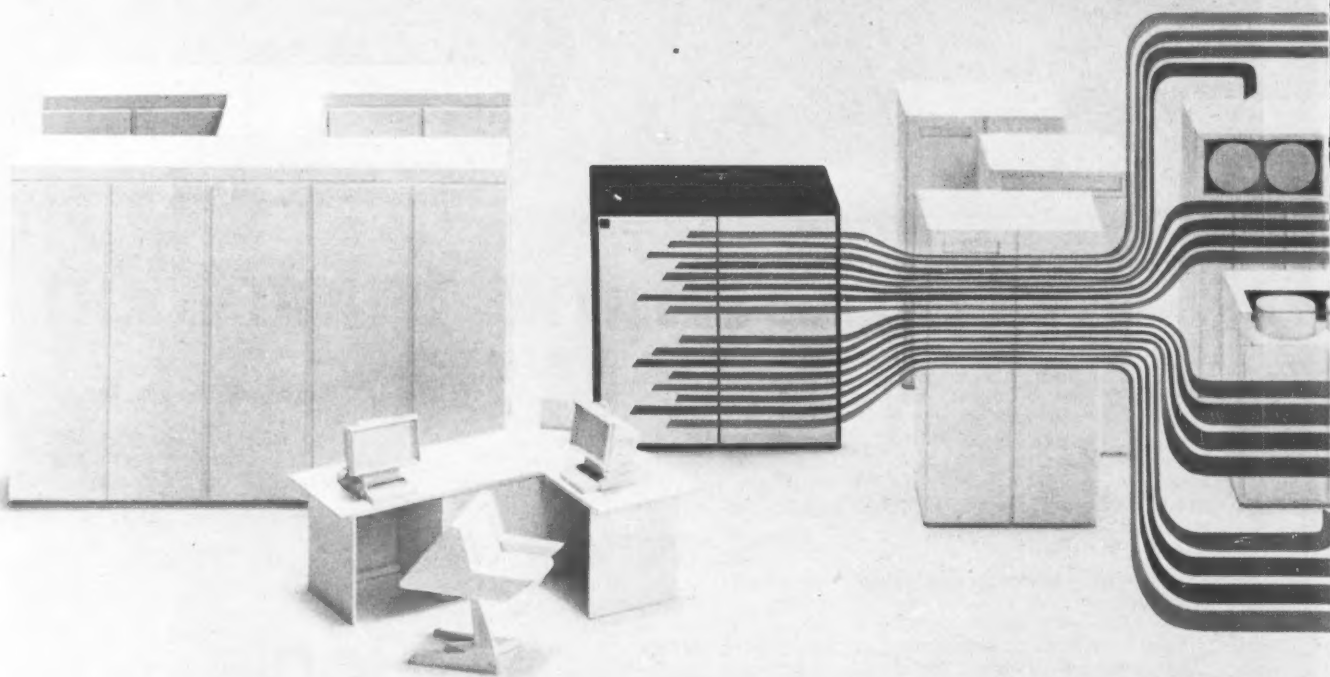
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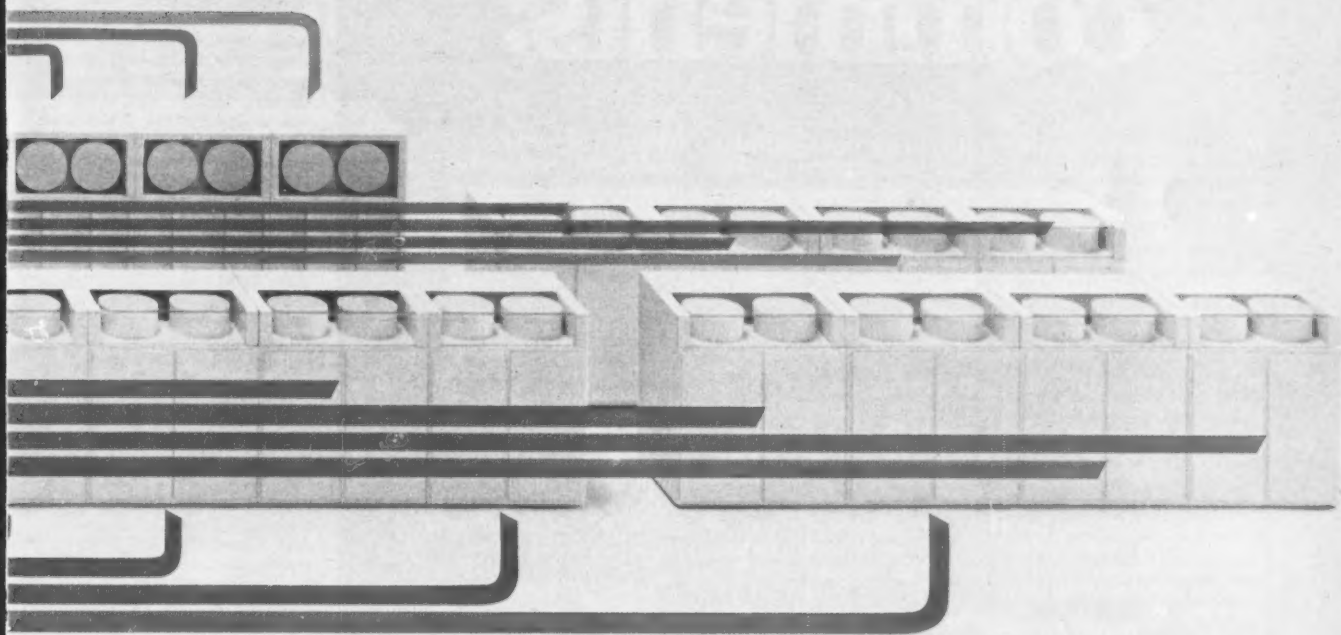
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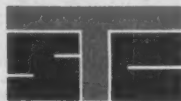
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Dobbertin Jr., Infosystems National Software Package Conference & Exposition, Suite 545, 222 W. Adams St., Chicago, Ill. 60606.

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"Accuracy is truth filed to a sharp point." — William S. Burroughs

It was the monotonous drudgery of his job that inspired a young bank clerk in 1882 to attempt to build an adding machine that would be accurate, fast and easy to operate.

Nearly two decades of frustration and repeated failures would pass before William Seward Burroughs succeeded in his struggle, but his success would be just the beginning in the life of a company that has evolved into a giant of the computer industry.

The first American to be considered in this history of computing was born to a rather unsuccessful mechanic on January 28, 1857 in Rochester, New York, although the family soon moved to Lowell, Michigan.

Moving back to New York several years later, to Auburn, William there attended public school, although he never went to college. Upon the completion of William's education, his father got him a job in a local bank as an accountant and bookkeeper. The elder Burroughs was determined that his son not become a mechanic.

William proved to be a tireless worker, even though the nature of the work was tedious and often required him to add, check and recheck long columns of figures far into the night. He is said to have reflected that half his time was spent guarding

against errors and a quarter of his time hunting for errors that had been made.

For a young man of 25, it was not a very exciting life. The world, however, was going through a period of excitement, one that would soon be demanding that the millions of columns of numbers in offices everywhere be added faster than ever before.

The transcontinental railroads were moving merchandise and mail more and more swiftly, creating a need for centralized and timely records. The telephone was on its way into the nation's offices, promising to reduce the time available for preparing statements of account or for searching out errors hidden in day books.

The future would belong to the swift, and Burroughs wholeheartedly entered the race against time. After five long years at the bank, he lifted his vision above the endless columns of numbers and determined to make a truly valuable contribution to humanity — an adding machine that would liberate workers from the tedium of calculation.

It was 1882. Burroughs' health had deteriorated from long hours of work and his doctor advised a warmer climate and a more physically active occupation. St. Louis became his new home and mechanic his new title (his father's earlier wishes notwithstanding).

Because Burroughs knew little of

Part 5 . . . William Burroughs: Liberation From Calculation

By Marguerite Zientara
CW Writer/Analyst

mathematics, design or the properties of materials, he rightly felt that the machine shop could teach him some valuable lessons he could apply toward his goal.

At Boyer Machine Co., it soon became clear Burroughs was a natural. He quickly acquired a reputation for special skill and when an intricate mechanism needed repairs, he usually made them.

Joseph Boyer, the owner of the shop, had occasionally observed Burroughs at work. Among other things,

(Continued on Page 24)



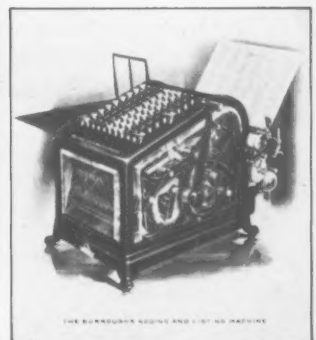
Courtesy Burroughs Corp.

William Burroughs



Courtesy Burroughs Corp.

Birthplace of the Adding and Listing Machine



Courtesy Burroughs Corp.

Burroughs Adding and Listing Machine

The History of Computing

(Continued from Page 23)

Burroughs made a collapsible chicken coop — a device that could be folded up and stored when not in use. So it is little surprise that Boyer once reportedly told someone seeking a helper, "I can't say where you can get a man, stranger, but I've got a boy you can use right well. This boy will do you more good than any man I have in the place."

Besides his regular work, Burroughs commonly spent his evenings and nights designing, on paper, the machine he hoped to build. His dream was to construct a machine that would record amounts on paper, add these figures and carry a progressive total, so that at any time one could press a key for a total up to that point.

Borrowing some concepts from the recording-adding machine then being developed by Dorr Eugene Felt (see related story), Burroughs hoped to improve upon that excellent and practical machine.

The only thing he lacked was money. Fate, however, brought Burroughs into contact with someone who was interested — and influential — enough to help round up

some capital. That person was a dry goods merchant, Thomas Metcalf, for whom Burroughs had repaired some machines. Within a few weeks, Burroughs and friend had raised \$700, which allowed him the luxury of the materials he needed.

Although he drew his first machine plans on paper, the fluctuations of weather caused the sheets to expand and lose their precision. So Burroughs began to make drawings with the point of a needle on polished sheets of copper.

Eyestrain resulted, so that he then began drawing plans on polished zinc that had been chemically blackened. The white lines on a black background proved it to be a workable and accurate method, which he continued to use.

Successive Failures

Success was not to come easily to Burroughs. His money used up, he was faced with the failure of his first machine model, completed in 1884. Dismayed but not discouraged, Burroughs doggedly worked on — sometimes for 48 hours without stopping — and soon produced a second model.

Although the second model also failed, Burroughs in 1885 applied for patents and in the following year, in the state of Missouri, the American Arithmometer Co. was formed. The stock was divided into four equal units — among Burroughs, Metcalf and investors R.M. Scruggs and W.R. Pye. Metcalf was chosen president, Burroughs vice-president and Scruggs treasurer.

By 1888 further improvements had been made and Burroughs was nearly ready to put his machine into production. By then, he was feeling pressure from the stockholders, and Burroughs made the mistake of starting manufacturing before he felt the design was perfect.

By 1890 the first batch of machines was being purchased by businesses. When reports started coming in on their performance, they were uniformly bad and the firm had to recall all 50 that had been sold.

The trouble with the devices lay in the main crank. For numbers to be satisfactorily accumulated, the handle had to be pulled steadily forward and then released — in a smooth motion.

Never one to give up, Burroughs

locked himself in his workroom for 72 hours and emerged only when he felt he had perfected a governor mechanism that would guarantee consistent performance of the machine, no matter how the operator yanked the lever.

His automatic governor, called a "dash pot," was a metal cup filled with oil in which a plunger worked to regulate the lever's movement.

As for the theory upon which the machine itself was designed, Burroughs was working in an era when key-driven machines were desirable, following the development of the typewriter in the early 1870s.

His design, however, called for the machine not to be driven by keys, but rather by a separate handle. The number was set on the keyboard, the pressed keys of which remained down to allow the operator to check the figure. When the handle was pulled, the number was added to the results register, as well as printed out.

One of the major problems was that of "carrying when, for example, '1' was added to 999,999. This was a stumbling block that had tripped up

(Continued on Page 26)

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Growth of Statistics Spawns Invention

A growing interest in social investigation had, by the second half of the 19th century, created a passion for the statistical method. Besides the eventually popular machines of Burroughs, other mechanical calculating inventions were springing up in America and abroad.

In 1850, the U.S. Patent Office issued a patent to D.D. Parmelee for a key-driven adding machine. He is said to have been the first to deviate from the use of numerical wheels, and in its place used a long ratchet-toothed bar. Parmelee also reportedly was the first to use depressible keys in a calculator.

Seven years later, Thomas Hill obtained a patent on a multiple-order key-driven calculator. While the device received a lot of attention, it had a fatal flaw. It failed to control the rotation of the numerical wheel under the tremendous speed that resulted from the use of depressible keys.

An alternative to Leibniz's historic stepped wheel was designed by Frank Stephen Baldwin in 1872

[CW, July 13]. Machines based on the design were made by W.T. Ohdner and the device became known as the Ohdner Wheel. Ohdner-type machines were widely used until the introduction of the electronic calculator in about 1960.

Inspired by the travails of C.X. Thomas [CW, July 13], Charles Babbage and George Schutz [CW, July 27], the American George Bernard

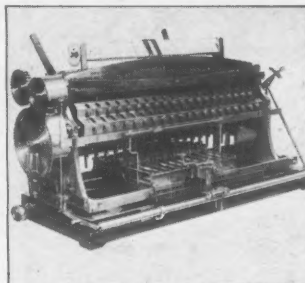
Grant constructed a monstrous Difference Engine, which he exhibited — along with several other calculating devices — at the 1876 Philadelphia Centennial. Master of the mechanical gear, on which his inventions were based, Grant was one of the founders of the gear industry in the U.S.

It was Dorr Eugene Felt who next addressed the problem of the multi-

ple-order key-driven calculating machine, in work that directly inspired Burroughs. In 1884, Felt conceived an idea from watching the ratchet feed motion, which was to lead to the mechanical basis for the modern calculator.

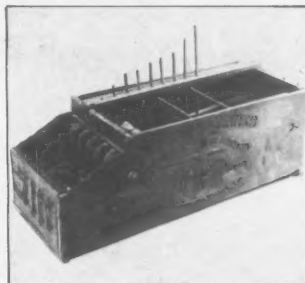
"I worked on the principle of duplicate denominational orders that could be stretched to any capacity

(Continued on Page 27)



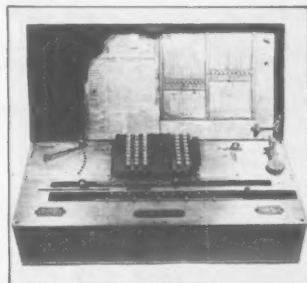
Courtesy IBM

Bollee's Multiplication Machine



Courtesy IBM

Steiger's "Millionaire"



Courtesy IBM

Felt's "Macaroni Box"

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The History of Computing

(Continued from Page 24)

many inventors of calculators.

But Burroughs solved the problem by making a separate column of identical keys for every decimal place, although a more compact machine could have been built using a 10-key keyboard. The smaller keyboard, however, would be vulnerable to errors made by pressing a key twice, or not hard enough, thus throwing off the calculation.

After seven years of constant toil and \$300,000 spent, Burroughs had perfected the machine he always knew was possible. As if to close the door on his long, frustrating struggle, Burroughs one day committed an act for which he is perhaps more famous than for all his inventiveness.

He entered the second floor storeroom where his 50 failed machines were kept, opened the window and

deliberately hurled each and every one into the back yard, smashing them to pieces.

As the last crash sounded, Boyer entered the room. "There," Burroughs reportedly said, "I have ended the last of my troubles."

Although his dramatic action was undoubtedly satisfying, Burroughs was to discover his troubles were not quite over. He still had to sell his perfected Adding and Listing Ma-

chine.

Although Burroughs himself had not expected spectacular sales, he had figured that 8,000 machines — one to every U.S. bank — would saturate the market. As it turned out, in the first years the machines sold at a rate of one a week.

The early sales promotion campaigns were haphazard at best. One Burroughs representative in Albany, N.Y., is said to have vanished into thin air, together with his demonstration machine. He was eventually located in a bar, sitting next to a wheelbarrow, which held the machine.

Asked how sales were going, the representative claimed to have given Burroughs excellent publicity. There wasn't a bar for miles around where he had not been, and in every one he had bet and won a drink on the machine's accuracy.

Such methods wouldn't do. In 1895 the firm's three best salesmen sat down and divided the nation among them, into territories of just more than a million square miles each. One man could travel 1,000 miles in a week to sell a single machine for small profit on the \$475 selling price.

Difficult as it must have been, the new sales policy created good will and proved successful. In a year sales went up to over 400 and two years later had topped 700.

With his dream realized, Burroughs retired to Citronelle, Alabama, where he died on September 14, 1898, after a long bout with tuberculosis. He was 41. On his burial place is a monument "Erected by his Associates as a Tribute to his Genius."

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(Continued from Page 25)
within reason," Felt later recalled. While his idea for a calculator called for metal parts, the youthful Felt could not afford metal and settled for wood.

"I went to the grocer's and selected a box which seemed to me to be about the right size for the casing. It was a macaroni box, so I have always called it the macaroni box model," he explained. "For keys, I procured some meat skewers from the butcher around the corner and some staples from a hardware store for the key guides and an assortment of elastic bands to be used for springs.

"When Thanksgiving Day came, I got up early and went to work with a few tools, principally a jack knife." Felt eventually had to have some of the parts made of metal, and he finished his model by New Year's Day of 1885. At the age of 24 he had made the first operative multiple-order key-driven calculating machine.

Still with limited funds, Felt had to manufacture his first models himself. Between the fall of 1886 and the next autumn, he produced eight finished models. Soon he had demonstrated and placed models at the U.S. Treasury and the New York State Weather Bureau.

In November 1887, he formed a partnership with Robert Tarrant of Chicago. The burgeoning success of the "Comptometer" was so complete that until 1902 no other machine of its kind was put on the market.

A colorful French inventor, Leon Bollee — also the founder of the famous Le Mans racetrack — built a direct multiplication machine in 1889 when he was 19 years old. His family needed the device to help prepare extensive tables of bell dimensions for its foundry at Le Mans.

While his later years were devoted chiefly to designing, building and racing light automobiles, Bollee also invented other calculators and office machines. His life of invention had begun at the age of 13, when he patented an unsinkable aquatic bicycle. An Englishman named Rigby rode it across the English Channel.

Building on Bollee's design, Otto Steiger of Zurich developed a machine in 1893 that used a mechanical "lookup" table, and was in effect an

automated version of Napier's Bones [CW, June 29]. Although cumbersome, the machine was popular, especially in scientific calculation. Between 1894 and 1935, 4,655 of them were sold

under the name "The Millionaire." From 1910 on, electrically operated versions were available.

Although Bollee and Ramon Vereha had built machines according to the same

principles, Steiger's was the first to be commercially successful. Vereha was a Spaniard living in New York City. After he developed his machine in 1878, he told the *New York Herald* reporters

that he "did not make the machine to either sell its patent or put it into use, but simply to show that it was possible and that a Spaniard can invent as well as an American."

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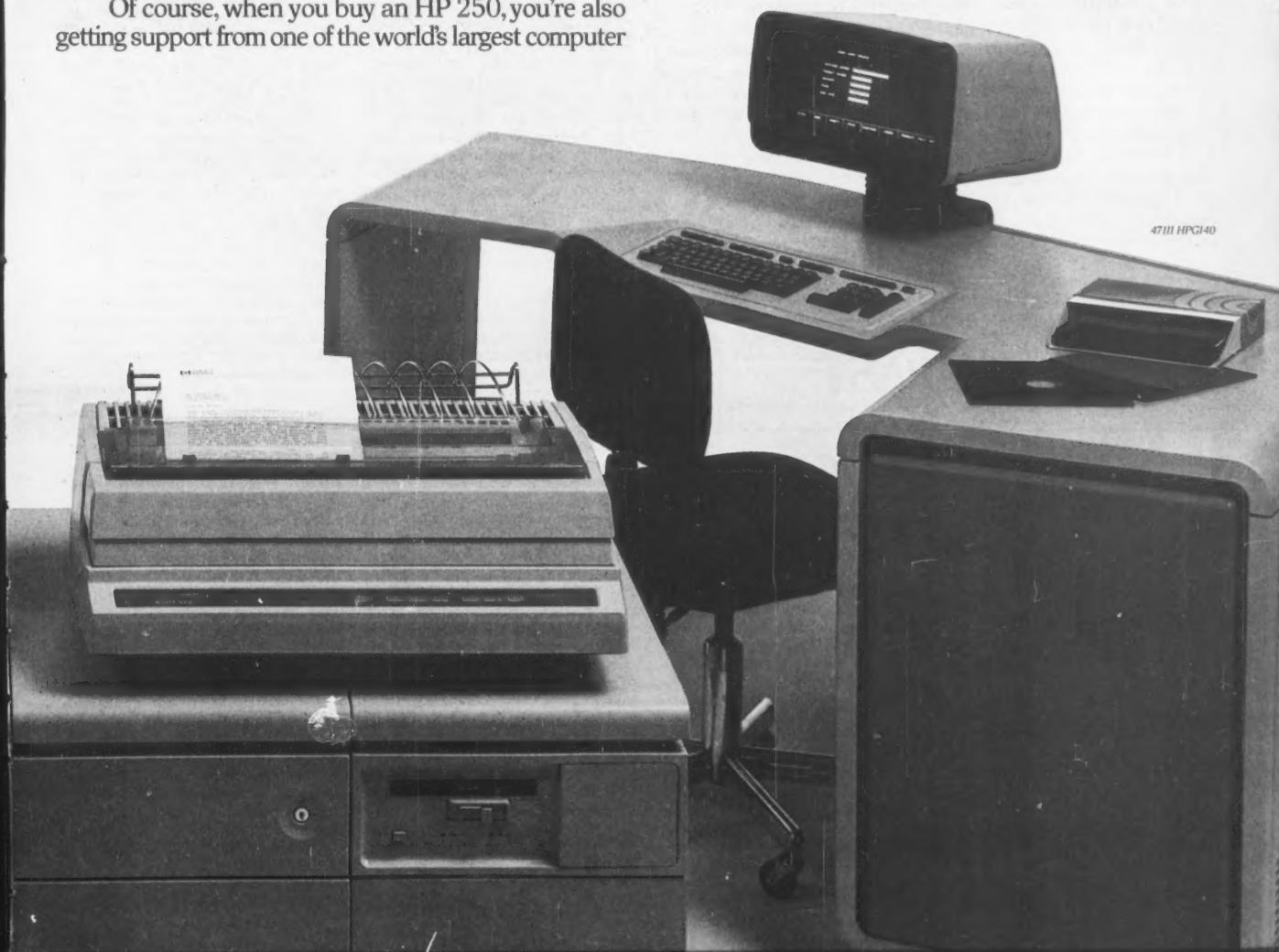
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EDITORIAL

Something for Everyone?

The on-again off-again nine-digit Zip Code plan of the U.S. Postal Service (USPS) has been one of the more confused regulatory undertakings of the federal government. True to form, the battle between USPS and Congress over this automation scheme has resulted in a compromise that offers a little for everyone but pleases no one — least of all, postal customers.

Despite a two-year delay in implementing the Zip + 4 project worked out recently in Congress, the Postal Service had by last week not halted its national advertising campaign trumpeting the supposed benefits to users of the longer Zip Codes.

Typical were two-page ads in several national magazines declaring "the accuracy, consistency and efficiency of your mail delivery will go up" if you use the longer Zip Codes. Well, maybe, but probably not anytime soon.

The recent congressional action means the post office will not be able to offer any rate discounts to nine-digit Zip users before late 1983. And you can't expect better mail service any time soon because post offices will not be allowed to sort by the longer numbers.

In spite of all this, it seems post office representatives are urging mailers to begin converting to the longer codes. And we are hearing from a number of DP shops that they are already, often reluctantly, beginning the conversion process.

Now that Congress has delayed full implementation of the Zip + 4 program, this would be good time to take a long hard look at the benefits, both promised and already available, to companies considering conversion. It will be at least a full year before the size of any eventual rate discount and the probable final congressional decision on the program will be known.

There is no reason to be railroaded into converting hundreds or thousands of files and programs. The nine-digit Zip Code is not inevitable.

This automation scheme has a lot to offer the post offices and private companies. But even if it is eventually approved by Congress it seems certain the longer Zips will always be voluntary. So if you don't want to convert — don't.

At the very least there's plenty of time to think about it.



LETTERS

On-the-Job Training

I feel it necessary to respond to the article "On the Job Training May Not Be Enough" [CW, July 20]. American Airlines offers its travel agency and commercial account Sabre subscribers extensive training opportunities that are not limited to on-the-job sessions, or even just basic training.

In addition to a one-week Sabre training class taught in a learning environment at American's Dallas/Fort Worth Learning Center, subscriber employees are offered three-day sessions in advanced ticketing techniques and in the production of invoice and itinerary documents. In addition, a one-week Train the Trainer program is offered so that key agency personnel may train others in the office should they desire to conduct local training sessions.

American also offers computer instruction courses that contain lessons stored in Sabre and that the agency employees may take at their leisure in the agency office.

These courses have been developed to assist agents who need refresher courses in basic functions as well as to provide instruction in other areas which would not justify a trip to American's training facility. The Sabre operating manual provided each agency contains instructions in how to do many auxiliary functions in Sabre. For the most part, the cost of these programs is embedded in the monthly equipment rental charges, so an agency incurs only the labor cost.

In view of this, I feel the title of your article and even some of the content is misleading in that American as an automation vendor offers extensive training services off and on the premises of travel agencies.

Richard E. Murray
Assistant Vice-President
Marketing Automation Programs
American Airlines

Fair to Prime?

As a former engineer for Prime Computer, Inc., project engineer on the 550-II processor and current user of a VAX-11/750 running Unix (fortunately), I have had a casual interest in several recent articles in *Computerworld*. The first, "Prime Forcing Users to Buy New Software?" [CW, June 29], received an adequate reply from a member of Prime's Users Group. The second, "Superminis: An Alternative" [CW, July 13], presented a supposedly accurate performance comparison between Prime's 550-II and 750 and Digital Equipment Corp.'s VAX-11/750 and 11/780.

Having designed the first machine and extensively benchmarked the others, I was shocked at the misrepresentation of the performance and prices of the DEC machines relative to the Prime products.

In reality, the Prime 550-II and the Prime 750 will significantly outperform the VAX-11/750 and 11/780, respectively, in most benchmarks other than single-user, heavy floating point benchmarks like Whetstone where the comparison is fairly even. I need not say anything about the instruction mix comparison of the Whetstone to most real programs. In Cobol benchmarks, performance factors of two-to-one or greater (in some cases much greater) for the Prime machines over the VAXs are typical and real-world multiuser performance is also in Prime's favor.

As for the price data, the article specified the prices of minimum configuration packaged systems for the DEC numbers and gave average system prices for the Prime machines.

CW readers deserve more accurate reporting, unless CW plans to market its paper at supermarket checkout stands.

Megatest Corp.
Santa Clara, Calif.

David R. Emberson

DATA PAST

Five Years Ago Aug. 26, 1976

WHITE PLAINS, N.Y. — IBM announced that users of IBM equipment would have to pay higher contract maintenance bills on about one-third of the equipment sold by the mainframer's Data Processing Division (DPD) as of Nov. 16. Hourly service rates for all of IBM's DPD and General Systems Division equipment as well as for systems engineering were increased by 15%.

NEW YORK — Dept-ridden New York City could save as much as \$5 million in the short run if it consolidated and overhauled its DP operations, according to a report issued to the mayor. The study, conducted by the DP Task Force of the mayor's Management Advisory Board, cited the lack of a focal point for citywide DP activities, underutilization of

present systems and severe shortage of qualified DP personnel as major problems.

Ten Years Ago Aug. 21, 1971

WASHINGTON, D.C. — President Nixon's new economic game plan to lead the nation to a "new prosperity" could be a boon for computer users if the large mainframe manufacturers decide to heed the spirit — if not the letter — of the President's proclamation.

WASHINGTON, D.C. — The inability of electric utilities to provide consistent, reliable power has "for too long been put aside," according to Sen. Lee Metcalf (D-Mont.), who called for a national system for exchanging electricity. Metcalf admitted such a system was at least three to five years away and might cost up to \$2 billion.

SOFTLINE / Werner L. Frank

Beware of Advice From Experts About Software

With the best of intentions, many experts on the scene wish to provide advice to the end user concerning software acquisition. These experts range from legally oriented practitioners and contract administrators to marketing organizations and individual consultants. Sometimes the advice comes from the experienced end user himself.

But such advice often breeds questions, one being what a typical user might conclude about the practicality and safety of buying commercial software when greeted by articles of advice with titles such as the following: "Contract Ploys Suggested for Users," "Perils of the Vendor-User Relationship," "100 Things You Need to Know Before Buying Software," "Software Licenses Fraught With Danger" and "License Pact Unfolded From Users' Viewpoint."

Attorney's Advice

One may also ask how users react to articles by attorneys attempting to "help" the prospective customer, where we find statements such as "licensing a software product from a vendor is a terrible responsibility." Another advises that it is best to "create a disparity of knowledge in starting negotiations for a systems purchase."

Users are admonished by these well-wishers to adopt a caveat emptor position. One might be led to conclude that the software sector of the computer industry is made up of charlatans and exploiters.

While advice is always welcome, it

can become confusing, as well as dangerous. Perhaps the intent was good, but the end result might be devastating. Let me give some examples.

The statement has been made that

'We are also often advised that delivered software may contain errors. In fact, one article advises the user that a software purchase, once installed, should be able to perform error-free. The better advice is, of course, that delivered software will contain errors because no piece of software is ever 100% perfect.'

in purchasing a major software program, the buyer should include, in the resulting sales contract, a detailed software specification. This advice is given to protect the end user from the possibility that the software delivered will not meet his expectations or perhaps not meet all his needs.

This advice is misguided in the case of software products. The commercial software that is delivered is not dependent upon a user's specification, but rather must ultimately rely for compliance on its own reference manual. To the extent that the user's requirements come close to being fulfilled by the functionality contained in the reference manual, all the better. But to turn the contracting around and look for a perfect fit is to obviate the entire concept of off-the-shelf, standard software. Indeed, if a client intends to go that route, let him buy customized software and pay the associated higher price.

Another bugaboo relates to comparing software companies with their hardware counterparts. It is sometimes asserted that the software company is typically weak and not long for the scene. In one recent article,

warranted fear in the buyer. Why allow the hardware companies to escape similar accusations?

If, indeed, the likely buyer is apprehensive about dealing with software companies, should he not be equally concerned in the hardware area? The issue really has nothing to do with size, nor capitalization, nor offering. Former users of computers manufactured by RCA, General Electric Co. and Xerox Corp. (nee Scientific Data Systems) could well testify to instability even among the giants, be they hardware- or software-oriented.

None 'Error-Free'

We are also often advised that delivered software may contain errors. In fact, one article advises the user that a software purchase, once installed, should be able to perform error-free. The better advice is, of course, that delivered software will contain errors because no piece of software is ever 100% perfect. Software is an evolving process. Software means change. If it were not for this, software would be hardware!

Users are also warned to protect themselves from the possibility of errors in software, and counselors sometimes even suggest that such errors should be subject to liquidated damages. Such advice is misguided and these well-meaning advisers simply do not understand the situation. There is no errorless software!

Up front we must all recognize that software is fragile and the user does indeed take a risk. The user takes this

(Continued on Page 34)

HUMAN CONNECTION/Jack Stone

Hope —and Problem DPers — Spring Eternal

In his latest letter to me, Bill Delaney, president of Analysis and Computer Systems, Inc. suggests pulling no punches with those DPers with attitude problems:

"Your article 'Text Gives Tips on Handling Problem DPers' [CW, June 22] prompted me to order the book under discussion. Hope springs eternal and I hope that when I read it, I will be better able to handle the 'problem personality' at work. In the past 25 years, I have met my share and I am sorry to report a 100% failure on my part to ever save, redirect or improve the performance of those with personality or attitude problems at work.

"I have had several bizarre experiences:

- A fellow who said the FBI and CIA were after him, but I never knew why.
- A fellow who felt the need to stand on his head several times a day in the office so gravity would force blood to his brain and improve and nourish his thought process. He was just as strange after, as well as before, his head stands.
- A fellow who burst into my home one Saturday morning to see me on a matter of vital importance to him. My wife told him I was upstairs tak-

ing a bath, so he ran upstairs and into the bathroom to discuss his problem with his startled and naked manager. If I had had any class or savoir faire, I would have had him scrub my back instead of throwing him out of the bathroom.

- A fellow who went through the cafeteria line at work and decided he did not like what he had selected, so he threw the tray of food at the wall and walked back to his office.

- A fellow who went out to lunch one day and never returned. He left a note on his desk pad saying goodbye to his manager. We have not seen him since. That was four years ago. Some lunch hour!"

Nature Gives, Takes

"As I sit here recalling these unusual situations, it occurred to me that four of these five men were very handsome and attractive. Perhaps nature gives and takes. One was a bachelor and the other four were divorced. I wonder why? I have to admit that the computer programming profession has, for some unknown reason, attracted far more than its share of strange and unusual personalities.

"These are, I admit, extreme situations; however, it has been my experience that trying to change some-

one's personality or attitude at work is almost an impossible task.

"None of us are qualified psychiatrists or psychologists and we really don't know why these people behave as they do. I don't even think they know. They act as if they had 'self-destruct' buttons on their foreheads and they are challenging you to push it for them.

"This stuff is in the field of medical science and well beyond the capacity of those of us who have enough difficulty trying to stay abreast of the rapid changes in the computer science field. When we meddle in areas beyond our knowledge, the probability of failure is very high. We can sometimes even make it worse.

"Problem employees fortunately are in the minority. One of my former bosses used to say, '10 % of any group is nuts.' However, they can wreak havoc far out of proportion to their small numbers. Some chronic symptoms of problem employees are:

- Chronic late arrivals at work and early departures.
- Constant complaining about everything.
- Enjoyment in seeing others make a mistake.
- Requests to see the boss about a

never-ending series of minor and major problems.

- Arguing with other employees, bosses and clients.
- Excessive use of sick leave.
- Repeated nonperformance, which is always someone else's fault.
- Attitude of superiority and resentment when asked about what they are doing and why.
- Requests for transfers and a fresh start elsewhere, with the problems repeating at the new assignment.
- Looking for secrets to keep or rumors to pass on to upset everyone else.
- Rudeness and insulting behavior under stress and sometimes for no apparent reason at all. Childish or immature behavior."

First Pity, Then ...

"When you observe these activities from anyone for a period of six months or more, you have a problem employee on your hands, and it won't go away. You first feel sorry for them and try to help, but eventually you can get tired of it. Sometimes a transfer can repair a personality clash, in which two people are fine individually, but not in combination.

(Continued on Page 33)

Missing Point

Your banner "Exec Says Programmer Productivity Just a Fad" [CW, June 22] misses the most important point made by Lamasney. The need for proper planning and design, and management's understanding of that need, is his vital point. Lamasney's further remark that software is a manufactured product is correct, but is unfortunately very poorly understood by our industry.

However, programmer productivity is far from a fad. Increased productivity is essential because programming is extremely labor-intensive

and because the work force is too small to meet the demand. Large organizations are beginning to recognize that productivity improvements can help them stem the growth of their programming organizations and, hopefully, hold the line on costs. More important, productivity tools can lessen the time between completion of the design and availability of the new system.

The essential point missed by La-

masney is that improving the productivity of programmers is simply a learning process, a step on the way to tools that will allow the users, or their analysts, to implement their systems directly. Ultimately, it will be possible to automate the "mechanical, monotonous, clerical job," and turn our "creative plumbers" to more challenging, productive work.

W.H.Fastie
Director

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Hunt Valley, Md.

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IBM's Policies

IBM's recent announcement ["IBM Datamaster Joins Ranks of Small Business Systems," CW, Aug. 3] reaffirms their use of planned obsolescence and forced software conversions.

It is obvious their efforts in bringing out new equipment are for only one reason, to sell more hardware. Customers' long-term interests are not considered when they introduce new equipment. They continue to make dead-end products that cannot be upgraded or have the software transported to new equipment. Lately this has been more apparent. The 5120 is a good example.

Firms that bought a 5120 own a machine that runs only on floppy disks. As needs increase, they find themselves with a software and hardware

investment that cannot be salvaged. Their software cannot be easily transported and operated on another machine without major conversion. They might as well start over.

As for the hardware, it simply cannot be upgraded at all. This situation is common with IBM. Other manufacturers do not operate this way and cannot afford to be so arrogant.

Such policies alienate IBM from their customers. Over the years, this alienation has been growing in the DP community. We all feel IBM has done an excellent job in providing the world with high-technology computers. But because of their irresponsible attitude in this area, there are increasing numbers who would applaud a situation in which IBM would lose a large amount of computer business to competitors, even to the Japanese.

Loss of business seems to be the only way industry-dominant companies such as IBM become more responsible to their customers' complete and long-term needs (note what has happened in the auto industry).

Obviously we cannot expect them to do everything right, but with all of their resources I feel they do not operate with the best interest of their customers in mind. If the business community cannot force them to change their policies, perhaps their conscience will.

Lynn Sattler
President

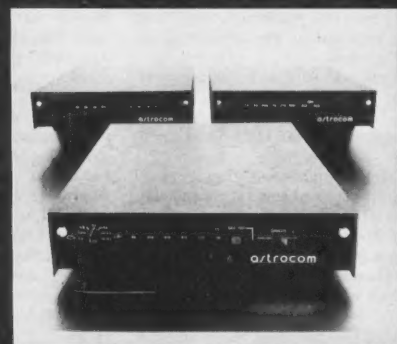
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Hope — and Problem DPers — Spring Eternal

(Continued from Page 31)

"Sometimes a personal tragedy — death, illness, accident, divorce and so on can affect a person's attitude temporarily and they should be given time to adjust their lives to their new circumstances. Most recover in a few month's time. I'm not discussing them.

"What I am discussing here is the employee who entered your outfit with problems from day one and, as time went on, it just got worse. Beware of these. Careful interviewing and screening can reduce the number you hired. Things to watch for at the interviews are:

- Many jobs in the past — few, if any, lasting more than one or two years. We call them 'grasshoppers.'
- Unexplained gaps in employment.
- Criticizing former employers at the interview.
- Special requests for exemption from certain company rules.
- Willingness to work only on certain types of jobs.
- Unwillingness to let you check with former employers.
- Wanting to tell you their troubles at the interview.
- Odd or unusual behavior at the interview. They may be nervous and that is all right. However, if they manifest nervousness by strange or weird behavior at the interview, look out! They can't handle stress.

"Some years ago, a new arrival asked to see me on his first day on the job. He said he had just ended a messy divorce situation on the West Coast and arrived here almost penniless. He asked if I could advance him some money on his future paycheck.

"I said, 'Certainly,' and reached for the telephone to arrange it. I asked him, 'How much do you need to tide you over?'

"He replied, '\$10,000 will be fine.' I slammed down the telephone and sent him from the office. He later told his manager that he must have upset me, but he could not, for the life of him, think why.

"One former secretary had forgotten to mail a very important letter to a client. The client called me about it. When I asked our secretary if she had mailed it, she said, 'Yes.' I asked the client to check his incoming mail. Later, we discovered the letter on the secretary's desk.

"I asked her why she said she had mailed it when she knew otherwise? She replied that sometimes when she gets upset, she said things she did not mean. I told her that in the future when she was about to say some-

thing that was not true, to raise her right hand as she said it, and then I would know she didn't mean what she was about to say."

Special Situations

"Certainly, there are rational reasons for some special situations; however, be careful when you note problems. You may be bringing in a problem employee.

"Let them explain the situation to you. Don't talk so much at interviews. Ask questions and listen to what they say and make your decisions.

"Our policy now, after 15 years, is the old Navy philosophy: 'Every dog gets two bites.' A serious behavior problem once repeated, must be cor-

rected once and for all, up to and including termination. It is best for 'the common good.'

"Sometimes you have to 'remove a toe to save the leg.' When you wait, it only has to come off at the knee later.

"The time and effort spent on one chronic behavior problem can well be spent elsewhere on more productive pursuits and with a much higher probability of success and benefit for all concerned. People's attitudes and behavior patterns are all set in place long before you ever meet them and I have yet to see any manager ever change anyone's behavior pattern one way or the other.

"We all make mistakes and a willing and cooperative person can learn just about any job and do it well. If

the person is not willing, regardless of the reason, you are talking to the wall. Advice just bounces off and falls on the floor. Trying to 'reason with' or play games with an adult to get him to do his job is a very trying and difficult process.

"In the long run, the odds are against you. I sincerely wish I thought differently, but 'old man experience' has taught me otherwise.

"Please remember, the authors of the book are trained psychologists and we are not. If we dabble in psychology, we will be as successful as a psychologist who tries to write a computer program. Neither the person nor the program will ever work efficiently."

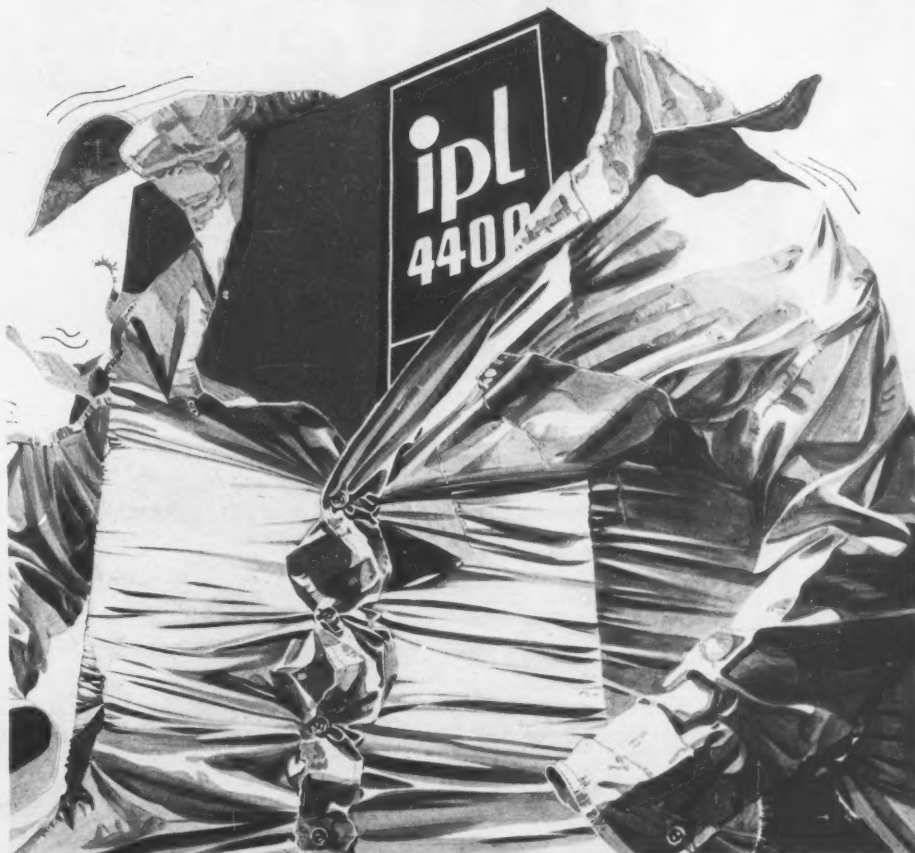
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COLA

Beware of Advice From Experts About Software

(Continued from Page 31)

risk whether he buys software from the outside or develops it in-house, under his own absolute and complete control.

And then there is the issue of the contract itself. Isn't it strange that highly qualified people will give advice to end users that they should be wary of standardized and printed contracts for commercial software and encourage incorporating modifications? In other areas of business, standardizations are well accepted. I am specifically reminded of the small print in a hotel laundry request sheet where it was stated that:

- (a) No claims of replacement can be made because of delayed delivery.
- (b) No guarantee can be assured for

alternation in colors.

(c) Liability is limited to five times the cost of cleaning in case of lost or damaged articles.

Have you ever not used such a service because of these conditions?

How often is the end user given the opportunity to tamper with the printed contract terms of the hardware manufacturer? Have you ever negotiated with IBM over agreement terms? Let us note, for example, what the typical IBM software contract agreement provides or, better, denies:

- Lease and not purchase.
 - At most six months' future support and maintenance.
 - No guarantee to fix defects.
- Certainly, by any standard, the in-

dependent software industry exceeds these limits by a long shot.

But the advice is not all negative. There are also many checklists and cookbook guides that provide assistance in purchasing software products. These efforts usually include the obvious control items common to any product acquisition, whether hardware or software.

We have examined a half dozen such guidelines and they are very similar.

Typically, they include checkpoints relating to the specific software characteristics, supplier background, purchase or lease options, contract terms, available training and support and the prospects for future maintenance. The number of line items that

are enumerated can easily range from one to 200.

At times, however, the recommendations go beyond reason such as, for example, the suggestion that the buyer obtain "rights to future enhancements" or subsequent price protection.

In all cases, the author of such advice should stipulate that any option or any right must have an associated price.

But when such "good" advice includes the provision by vendors of free trials, no cost for on-site training and subsequent support "at no additional cost," we must raise an objection.

User Must Pay

As with everything else, there is no free lunch with software. One way or another, the customer must pay for what he receives. Rather than confuse the pricing and contracting situation by suggesting that all deliverable elements be subsumed under a single amount, the customer is better advised to have the vendor identify the component tasks and functions and establish a fair price for each.

The software product industry has come of age. Hundreds of firms provide quality and supported products. Many of these products have been offered for more than a decade, demonstrating a viability tested by both numbers of installations as well as the total sales dollar. In fact, the independent producers of commercial software will generate around \$1 billion of sales in 1981, and these sales are growing at close to 30% per annum.

Frank is executive vice-president of Informatics, Inc. in Woodland Hills, Calif.



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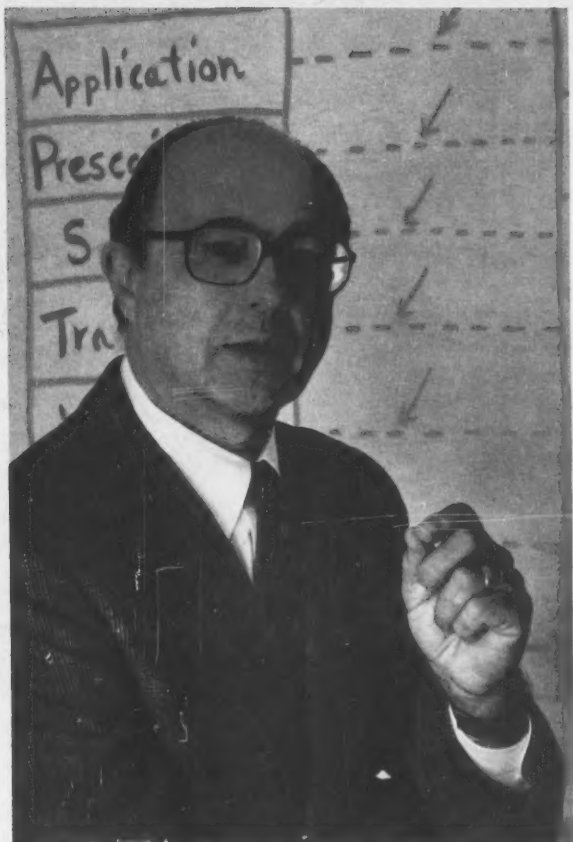
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Bachman on Cullinane



"I joined Cullinane Database Systems because it is an independent software company with a reputation for excellence and integrity. As a software engineer and inventor, I felt a kindred spirit with Cullinane in its dedication to delivering the best in system and application software to the marketplace.

"Cullinane as a company displays imagination, strength, and vitality. Its youthful, enthusiastic people are undeterred by so-called impossible tasks.

"As a database pioneer with 25 years' experience, I was eager to join the organization that had taken my invention, the Integrated Data Store, and made it a technical and commercial success on the biggest family of compatible computers in the world.

"My first months with Cullinane have substantiated my reasons for joining the company and exceeded my expectations for personal involvement. The opportunities to pursue new product development and enhance existing products have been numerous and rewarding. I feel as though I have come home."

Charlie Bachman is an original. Original thinkers and innovative ideas help create superior software. Cullinane's Integrated Database Management System (IDMS) typifies this principle. IDMS is the dictionary-driven DBMS that installs quickly, is comprehensible to non-DP management and can greatly increase your DP staff's productivity. Find out first hand how our ideas can work for you by attending a free IDMS seminar in your area.



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9	Winnipeg, MAN	17	Houston, TX	1	Calgary, ALT
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Database: Cullinane

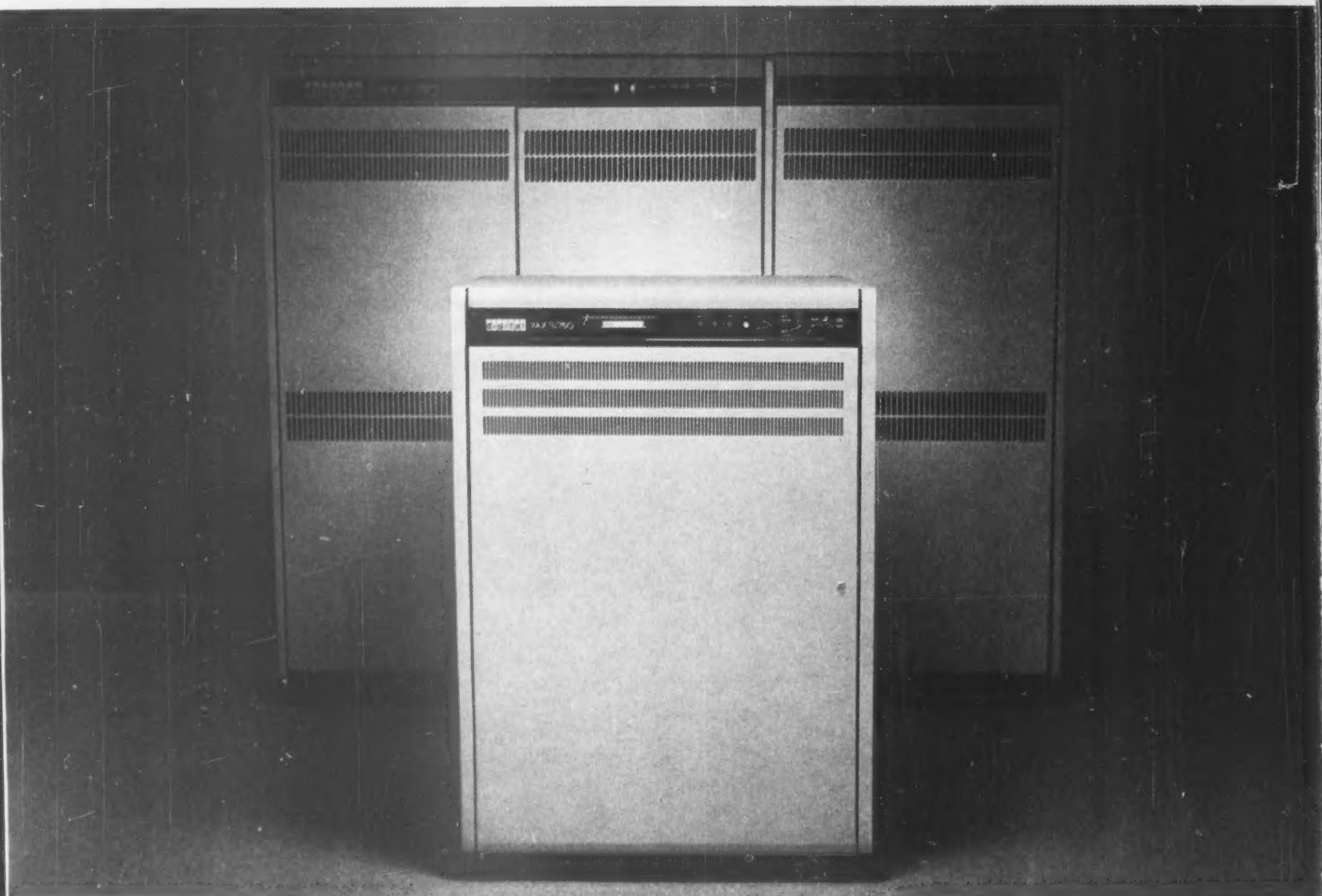
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CW 8-24

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Wisdom Questioned

The editorial "Close Call" [CW, June 29] states that air traffic controllers have a right to strike, despite arguments to the contrary by the Federal Aviation Administration (FAA). I disagree, and find it interesting another article in that issue of *Computerworld* was headlined "DPers Chastised for Neglecting Corporate Goals."

I question your wisdom and logic in maintaining that civil servants have a right to strike.

The editorial may be a medium for the expression of your sentiments, but do you honestly feel that because a person works with computers he is exempt from his primary duty of being a responsible employee and a law-abiding citizen? And you wonder why more data processing personnel don't become top executives! Historically, there have not

been many data processing personnel promoted to top executive positions. Your editorials are an excellent means of providing constructive guidelines — why not use them to help direct DPers to more responsible roles?

Peter J. Leofsky, CPC
President

Dapexs Consultants, Inc.
Syracuse, N.Y.

LETTERS

What's In a Word?

"Commerce: Watch Your Language" [CW, Aug. 10] notes Secretary Malcolm Baldrige decries redundant (pleonastic) frivolous talk (persiflage). Baldrige, reputed to toss a mean loop from horseback, may not recognize it is what one communicates that benefits government, not the style of the

communication.

Yep. Nope. Both are western classics. They are both clear and undeniably short. If the world were reduced to yes/no, perhaps the secretary would be delighted, but our world would be forever benighted. As for "writing halfway between Zane Gray and Ernest Hemingway," as much as we could enjoy a 1,000% improvement in writing, it would remain style over substance.

"Covering one's flanks" is communicating. Baldrige misses the message — nary a nope or yep in it. The message is fear. Fear that the opinion rendered is at loggerheads with the bosses' opinions, the conventional wisdom of the moment or political expediency. Fear, too, that recipients of the opinion cannot understand and therefore want material of uncertain opinion which will mask incapacity.

Communication begins when people want to understand and have open, capable minds. Until then, protection, vagueness and needless rhetorical repetition (tautologous) leaks will continue. First, what did you say, then — only then — how did you say it.

C.A. Hirsch
Systems Programmer
Brooklyn, N.Y.

Baseball Talk

As a long-time fan of Strat-O-Matic baseball, I can assure you that the fielding and running ratings are hardly "arbitrary," as your article "What Would Babe Think?" stated [CW, Aug. 3].

In Strat-O-Matic, as in real life, Omar Moreno will run circles around Greg Luzinski.

Alan T. Saliwanchik
President

Horizon Information
Systems, Inc.
Dayton, Ohio

Computerworld welcomes comments from its readers. Preference will be given to typed, double-spaced letters of 150 words or less. Letters should be addressed to Editor, *Computerworld*, P.O. Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

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DBMS: What's the Buzz About?

DBMS. That's one of the hottest buzzwords today — but do you really understand it? Are you clear, for example, about the meaning of such terms as "relational" and "hierarchical" and how they relate to your own installation?

Computerworld will delve into data base management systems in a Special Report this November. We want to know about your experiences with these systems. Are they making life easier and increasing your staff's productivity? Or are they creating problems that never existed before?

Tell us what it took to bring your batch data base on-line. Describe the impact the DBMS has had on the flow of information within your company. Pose the questions and the insights you have about DBMS.

Pictures, charts and/or graphs are welcome accompaniments. Send your stories (no more than six double-spaced, typewritten pages, please) by Oct. 2 to Rita Shoor, Senior Editor/Software, Computerworld, P.O. Box 880, Framingham, Mass. 01701.

IDM Now Runs On IBM Series/1

LOS GATOS, Calif. — Britton-Lee, Inc.'s Intelligent Data Base Machine (IDM) now works with IBM Series/1 minicomputers, the vendor announced here.

The IDM is linked to the IBM Series/1 over the standard IBM General Purpose Interface Bus parallel or RS-232 serial interface. It reportedly provides specialized hardware and software to perform high-speed relational data base management functions.

The IDM is being marketed mostly to OEMs, but end users can use the IDM-Series/1 to expand to more powerful IBM machines without obsoleting their current data base management systems (DBMS), according to Britton-Lee. The Series/1 would act as a back end to the mainframe and a front end to the IDM, the vendor added.

IBM's SQL query capability reportedly can be employed by the user to access the IDM-controlled DBMS.

The IDM is available to OEMs for between \$60,000 and \$70,000, depending on options selected. End-user prices would range somewhere between \$150,000 and \$200,000, Britton-Lee said from Alhright Way, Los Gatos, Calif. 95030.

T/S Firms Braced for Boom In Demand for Graphics

By Rita Shoor

CW Staff

CAMBRIDGE, Mass. — Time-sharing firms expect "extraordinarily large growth" in computer graphics during the next five years, according to survey results presented during the recent Harvard Graphics Week conference here.

The prediction was based on a survey of more than 50 commercial time-sharing companies that currently offer computer graphics capabilities.

Conducted by Eric Teicholz, associate director of the Laboratory for Computer Graphics and Spatial Analysis, and Stephanie Teeter of Design and Systems Research, Inc., the survey was conducted with in-depth telephone interviews, along with reviews of product literature and user manuals.

High Hopes

It was not uncommon to see firms predicting that as much as 30% to 50% of estimated revenue for these firms would come from computer graphics within the next decade.

However, in most cases graphics still represent only 1% to 5% of the business handled by time-sharing firms, according to the report presented in a conference session on "Services for Graphics Users: Where to Go and What They'll Give You When You Get There."

One reason for the low percentage is that most time-sharing companies support relatively inexpensive nonintelligent terminals that make graphics "extremely slow" over voice-grade telephone lines, the authors said.

However, they predicted that the advent of private, high-speed communication networks, the upgrading of analog networks by AT&T and the increasing availability of intelligent terminals would eliminate this technical handicap, the survey said.

In addition, the time-sharing firms generally surcharge users if the graphics software being utilized was not developed in-house. This makes for "fairly expensive graphics use."

Dominating Packages

The survey also showed that a few general-purpose graphics packages tend to dominate among the products offered by the service firms. Discounting the Plot-10 package from Tektronix, Inc. and California Computer Products, Inc. software, Integrated Software Systems, Corp. Display and Tell-A-Graf products led the list. They were followed by Sas/Gra and some of the

thematic mapping software from the Harvard lab.

A third survey result indicated that many of the graphics services on commercial time-sharing networks are large number-crunching engineering applications that must be run in batch mode.

Interactive usage is normally confined to conversational remote job entry mode for relatively simple I/O operations to the batch program, the report stated.

Meet Draws Mixed Reactions

CAMBRIDGE, Mass. — More than 500 people attended the recent graphics conference sponsored by the Harvard Laboratory for Computer Graphics and Spatial Analysis here. That number was relatively easy to obtain from Ira Alterman, the program director. But perceptions of what attendees expected to get out of the conference varied dramatically, depending on who was speaking.

George Cook, a systems programmer from Alaska's Department of Fish and Game, felt that "almost everyone here is concerned with computer mapping." "Here" was a three-hour presentation on "The Best and Newest in Computer Graphics Software" at which business-related graphics ran a distant second to explanations of state-of-the-art products for computer-aided mapping and geographic information processing.

Different View

Mitchell Kapor, president of Micro Finance Systems, saw things differently. He felt the dominant profile of attendees was "middle managers who are techies," with systems programmers in the minority — "maybe 20% of the total audience."

Kapor, whose firm developed the Visiplot general-purpose business graphics program, was obviously not focused on the same areas as Cook. But both men were present during the software overview that drew an overflow crowd.

"The software marketplace is moving from its adolescence into a mature setting," according to William Nisen, manager of technical services for Computer Pictures Corp.

Judging from the heavy attendance at sessions devoted to software issues, the market's growth will be monitored by a wide variety of specialists.

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W112

'Datacom/DB' Gets Relational Aid

PRINCETON, N.J. — A Relational Index System that reportedly moves Applied Data Research, Inc.'s (ADR) Datacom/DB closer to a fully relational data base management system (DBMS) will be available in the first half of 1982.

Release 7.3 of the Relational Index System (RIS) manages large synonym populations and inverted fields per record, according to ADR. RIS

also includes a dynamic balancing option for continuous operation with no reorganization and offers key compression to reduce the amount of disk space required for the index. Data area unload/reload can be eliminated when creating and recreating a data base index, the firm said.

Other features include an additional user program service entry point with en-

hanced audit trail and security capabilities; the number of data bases will increase from one program concurrently to 999 and special features in support of the high-level nonprocedural application development language used by ADR's Ideal Application Development System.

Additional features include enhanced backup and recovery capabilities, support for IBM 3375 and 3380 disk

drives, improved Snap dump and statistics file handling and improved statistics integration with Datacom/DB in a data base/data communications environment.

The permanent license fee for Datacom/DB starts at \$57,000 for OS installations and \$47,000 for DOS sites. Leasing is also available from ADR at CN-8, Rt. 206 & Orchard Road, Princeton, N.J. 08540.

Update Rules DOS At CICS Site

ATLANTA — Release 1.1 of the Computer Scheduling and Reporting (Csar) package for IBM DOS and DOS/VSE users has been introduced here by Software Concepts, Inc.

Csar reportedly operates in CICS environments, giving the user expanded terminal facilities for on-line inquiry and tracking of jobs in the production schedule. It also is said to offer automatic job submission from the user's job control language library.

The price of Csar has been reduced to \$9,900 with the new release, including all features and options. Lease, purchase and rental plans also are available.

A 30-day free trial is offered to qualified and interested companies, including two days of training in Atlanta, the vendor said from 1450 Atlanta Center, 250 Piedmont Ave., N.E., Atlanta, Ga. 30308.

Report Tool Backs Users Of Series 21

PARSIPPANY, N.J. — Mohawk Data Sciences Corp. (MDS) has announced the Series 21 Reporter package, which it said allows users of its Series 21 distributed processing systems to produce management reports based on data held on diskette or disk files.

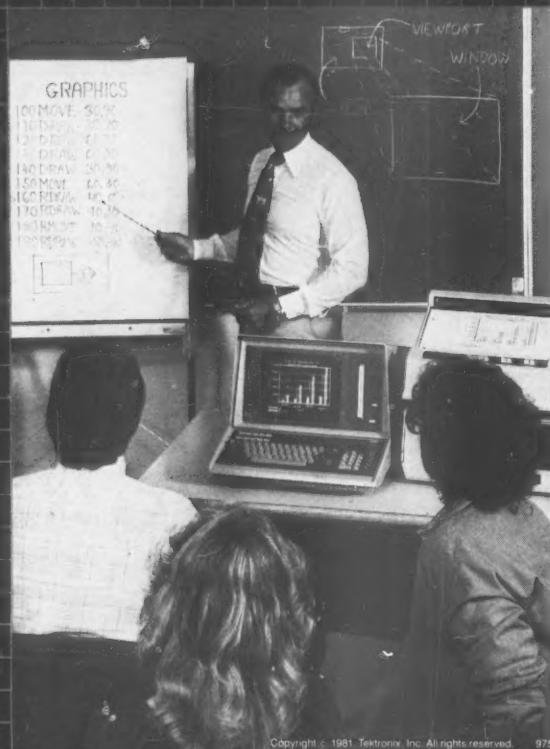
The package can be used with any System 21/40 or System 2/50 distributed processing system, which has 96K bytes of memory and two diskette drives, the vendor said, adding that two operator stations may simultaneously use the program.

Series 21 Reporter includes prompts to guide the operator and has six parameters for report generation that can be specified for each report. Two breakpoints for totals and subtotals can be defined, MDS said, and the operator can optionally print only totals.

Other features include automatic column tabbing, selective printing of column totals, the ability to print any screen display for documenting report parameters, operator messages flashed to the operator as part of the start-up procedures and report titles and column headings.

Series 21 Reporter is priced at approximately \$550 with an additional \$100 one-time fee for installation and training. MDS is headquartered at Seven Century Drive, Parsippany, N.J. 07054.

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177 Santa Clara, CA	Aug. 17-21, 1981
178 Santa Clara, CA	Sept. 14-18, 1981
179 Rockville, MD	Sept. 21-25, 1981
180 Rockville, MD	Oct. 5-9, 1981
182 Santa Clara, CA	Oct. 12-16, 1981
183 Dallas, TX	Oct. 26-30, 1981
184 Santa Clara, CA	Oct. 26-30, 1981
185 Rockville, MD	Nov. 2-6, 1981
186 Rockville, MD	Nov. 30-Dec. 4, 1981
187 Santa Clara, CA	Nov. 30-Dec. 4, 1981
188 Dallas, TX	Dec. 7-11, 1981
189 Santa Clara, CA	Jan. 4-8, 1982

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Boole & Babbage Updates Support for IMS

SUNNYVALE, Calif. — Boole & Babbage, Inc. has announced Release 2.0.0 of Control/IMS and Release 2.1.0 of Control/IMS Realtime, its software products for management and monitoring of IBM's IMS data base management system.

The two releases reportedly will now operate together as a total system analyzer of IMS and provide the user with on-line IMS response time reporting.

Control/IMS Realtime's reporting of IMS response times is possible through a new interface to Control/IMS, the vendor said. Immediate response time information reportedly is available by user, transaction, processing class, terminal, program and dependent region.

This feature is said to allow response times to be monitored and action taken if service levels begin to degrade or impact the users. As an additional feature of the interface with Control/IMS, Control/IMS Realtime reportedly can be automatically

started and stopped at predetermined times by Control/IMS.

Control/IMS has been enhanced to allow installation with no modification to any IMS code, the vendor said. Other features include a fail-soft coding technique and a streamlined architecture that reduces overhead.

Control/IMS Realtime is an on-line operation and performance monitoring tool

for IMS/VS under data base and data communications environments, which is designed to provide real-time information (displays) on scheduling, pool utilization, region and data base activity.

The Asynchronous Services Option is said to continuously monitor nearly 70 key performance variables and automatically send warning messages when potential problems exist. No modifica-

tions to IMS are necessary, according to Boole & Babbage.

Control/IMS and Control/IMS Realtime sell for \$20,500 and \$22,800, respectively. They operate under IBM's MVS, VSI and SVS for IMS/VS 1.1.5 under data base and data communications environments and later releases, the vendor said from 510 Oakmead Parkway, Sunnyvale, Calif. 94086.

'P/O Plus' Automates Purchasing For Users

NEEDHAM HEIGHTS, Mass. — Software written in Ansi Cobol for IBM main-frame users and designed to automate the clerical portion of the purchasing function was introduced here by McCormack & Dodge Corp.

P/O Plus reportedly processes requisitions, standard and blanket purchase orders, receipts, inspections, debit memos, partial shipments, back orders and system contracts.

It was also designed to provide reports such as inspection analysis and part/vendor evaluations. The latter ranks by price, delivery and quality criteria, which is weighted according to individual requirements, receiving and purchasing order status and overdue reports.

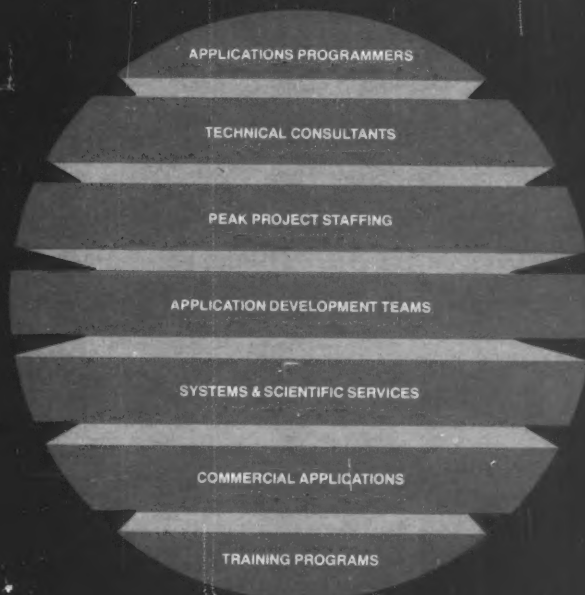
Matching Module

The Matching Module, which interfaces P/O Plus with the vendor's accounts payable software (A/P Plus), reportedly permits distribution to appropriate general ledger accounts and projects cash requirements from the time of purchase order issuance.

It also allows for an automated four-way match of purchase order, receipt, invoice and inspection documents.

Quantities and prices falling outside of user-defined tolerances will not "match," generating a discrepancy signal, according to McCormack & Dodge.

P/O Plus currently is offered for IBM 360, 370, 30 series and 4300 series configurations and is priced at \$20,000 for batch systems only. McCormack & Dodge is headquartered at 560 Hillside Ave., Needham Heights, Mass. 02194.



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You can be there as our specially picked panelists discuss a broad range of industry and business topics and tell you:

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- How to protect your margins
- How to spot a trend
- How to avoid the pitfalls
- How to plan for growth

You can also participate in a wide spectrum of Workshops at THE OEM BUSINESS FORUM and learn more about network configuration, sourcing software packages, design trade-offs in small systems, legal problems and solutions, applications dynamics, new markets, Europe and Japan, and much, much more!

In addition, you'll hear the very latest that's happening at DEC, DG, TI, IBM and HP at a series of Watch Workshops spotlighting key executives from these major manufacturers. (And you'll have plenty of time for questions!)

What's more, at THE OEM BUSINESS FORUM, you can listen to some of the leaders in the OEM marketplace, speaking on a variety of topics vital to your future in this business. (For a look at some of the speakers in store for you, see the listing in this advertisement.)

No ordinary conference

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October 5 (Day 1)

8:45-9:15 **Keynote**
A-1 Al Lay
President
Cado Systems Corporation

9:15-9:45 **Coffee Break**
9:45-10:45 **Mini & Micro Based OEM Business Update**
A-2 Lawrence Chimierine
President
Chase Econometrics,
A Div.
of Chase Manhattan Bank
Richard Raysman
Attorney/CBN Columnist
Brown & Raysman

8:45-10:45 **The Magic of Sales**
A-3 Robert Hardy
President
Computer Composition
International

11:00-12:00 **OEM Survival Tools for the 1980's**
A-4 Jack Keen
Director, Management
Products
Input

11:00-12:00 **Acquisition and Diversification**
A-5 Gilbert Mintz
Partner
Broadview Associates
Robert J. Conrads
Principal
McKinsey & Company

12:00-1:30 **Luncheon**
Art Holst
Author/NFL Official
"The Challenge of a Pro"

1:30-2:30 **Influence of Growing Local Networks (Part I)**
N-1 Chairperson:
Robert Wickham
Vice President, Marketing
Vector Graphic, Inc.
Robert D. Brannon
Marketing Manager
OEM Microcomputer
Systems
Intel Corporation

2:45-3:45 **Influence of Growing Local Networks (Part II)**
N-2 Dr. Harry Saal
President
Nestar Systems
Ivan Socher
President & CEO
Amdax Corporation

2:45-3:45 **Intelligent VDTs and Desktop Systems**
N-3 Jon R. David
President
Systems R & D Inc.
Brian Green
Regional Director
Tandem Computers

1:30-2:30 **Input/Output: Market & Technological Structures**
T-1 Joseph G. Morris
Senior Vice President
Ramtek

Meldon K. Gafner
Director of Marketing
Communications
ISSCO
Peter Eisenhauer
Vice President, Marketing
Integral Data Systems

2:45-3:45 **Mass Magnetic Memory: Market & Technological Structures**
T-2 Chairperson:
Andrew Roman
Consultant
Random Access
International
Larry Hemmerich
Vice President
Cipher Data Products

4:00-5:00 **Voice I/O and Other Analogue I/O: Market & Technological Structures**
T-3

Len Magnuson
Vice President, Marketing
Centigram
Edward O'Neil
Marketing Manager
Voice Products
Interstate Electronics
1:30-2:30 **Retail Outlets**
O-1 David Pava
President
Byte Industries
Philip L. Reed III
General Manager
On Line Microcenters

2:45-3:45 **Are You Ready for An Ad Agency?**
O-2 Chairperson:
Thomas Casalegno
Publisher
Computer Business News
Robert McCullough
President
Aitkin-Kynett/SCB
Steven Tatum
Director of National
Marketing
Televideo

4:00-5:00 **OEM Agreements**
O-3 Sonny Monosson
Chairman of the Board
American Computer
Group, Inc.

1:30-2:30 **Application Generating Tools**
S-1 Chairperson:
William R. Stow
President
CPU International
Kent Lawson
President
Magna Systems
Chuck Butkus
President
The Software Factory

2:45-3:45 **Software Management Strategies**
S-2 James Pettinger
Consultant/CBN
Columnist

Stephanie Rosenbaum
President
Tec-Ed

4:00-5:00 **Application Dynamics: Planning for Changes**
S-3 Gary Long
Partner
Lupper & Long

1:30-2:30 **Microcomputer Trends**
P-1 James J. Farrell III
Manager, Technical
Communications
Motorola, Inc.
Casey Powell
General Manager
Special Systems
Operations
Intel Corporation

2:45-3:45 **Legal Aspects of the Third Party Market**
P-2 Peter Vogel, Esquire

4:00-5:00 **Desktop Computers**
P-3 Allen Michels
President
Convergent Technologies

1:30-2:30 **IBM Watch**
C-1 George Pazloff
Director of Value Added
Remarketing
General Systems Division
IBM

H. W. Mattison
Program Manager
Value Added Remarketing
General Systems Division
IBM

Paul H. Espersen
Series 1 Technology
Consultant
IBM

2:45-3:45 **HP Watch**
C-2 Bob Kresak
Marketing Manager,
Worldwide
Third Party Sales
Hewlett Packard

4:00-5:00 **TI Watch**
C-3 Dr. W. Kenneth Wickham
OEM Marketing Manager
Texas Instruments

October 6 (Day 2)

8:30-9:45 **Japanese Vendors "Meet the Press"**

B-1 Thomas Hodson
National Sales Manager
Canon USA, Inc.
John Rehfeld
Vice President
Information Systems Div.
Toshiba
J. Garrett Fitzgibbons



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TRW-Fujitsu Company
Philip E. Wyatt
Manager
Office Products Division
Sony Corp. of America

9:45-10:15 **Coffee Break**

10:15-11:15 **Software: The Growth Area of the Decade**

B-2 Ann Winblad,
Marketing Director
Product Planning
Open Systems, Inc.

James Pettinger
Consultant/CBN
Columnist

10:15-11:15 **Financing Your Business and Product Development**

B-3 Gordon Rapkin
Chief Executive Officer
AMSI

11:30-12:30 **Sales & Marketing Planning**

B-4 Howard Levin
Director, Systems
Marketing
Arrow Electronics, Inc.

11:30-12:30 **Stop Giving Away Services**

II-5 George McArthur
Sales Manager
Decision Data

12:30-2:00 **Luncheon**

William Moore, Jr.
Vice President, Computer
Operations
Perkin-Elmer Corporation
"Technology Futures"

2:00-3:00 **Europe as a Market**
M-4 Christopher Codrington
Interco Business
Consultants, Ltd.

3:45-4:15 **Beyond the European Market: The Next Step?**
M-5

2:00-3:00 **PR: The Unified Corporate Philosophy**

U-4 Chairperson: Vic Farmer
Editor
Computer Business News
Carole Ely
Sr. V.P., Communications
Vector Graphic, Inc.

Mark Nigberg
President
The Nigberg Corporation

3:15-4:15 **Office Automation: One Stepping Stone Beyond WP?**

U-5 Phil Roybal
Manager, Computer
Programs
Apple Computer

Thomas R. Sinopoli
President
Thomas R. Sinopoli Assoc.

2:00-3:00 **Special ADAPSO Session**
P-4

2:00-3:00 **Sourcing Software**
S-4 William Grinker
President
American Computer
Group, Inc.

3:15-4:15 **Watering the Software Desert**

S-5 Ben J. Dyer
President
Peachtree Software Inc.
Barbara L. Stafford
Director, Sales & Market-
ing
TCS Software

2:00-3:00 **DG Watch**

C-4 Patrick Dodds
Marketing Manager
General Distribution
Data General Corporation

Al Ormiston
Product Mktg. Mgr.
Data General

Richard R. Farwell
Director Mktg. Support
Small Business Sys. Div.
Data General

3:15-4:15 **DEC Watch**
C-5

"SPECIAL EARLY BIRD SESSION"

October 6, 1981

7:45-8:30 AM

"INVESTING IN THE OEM INDUSTRY"

Frank Kline
Vice President, Research
Drexel Burnham
Lambert

Marc Schulman
Vice President
First Boston
Corporation

Registration Information

Cost is \$295 for two full days of sessions and lunch each day. There will be a \$50 service charge for cancellations after September 28. Registration may be transferred at no charge. Contact the New York Hilton directly for hotel accommodations; call 212-586-7000, and mention you'll be attending THE OEM BUSINESS FORUM.

Registration Form

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Telephone _____

A. Product/Industry.

Please circle ONE only.

- 10 Systems Integrators/Systems Houses
- 20 Software/Service Vendors
- 30 Multi-Quantity End Users
- 40 Manufacturers of Computer Systems or Peripherals
- 50 Manufacturers of Office, Business, Personal and Consumer Systems
- 60 Hardware OEMs
- 70 Distributors/Dealers/Retailers
- 80 Consultants
- 90 Other (Specify) _____

B. Title/Function.

Please circle ONE only.

- 10 Corporate Management
- 20 Operations Management
- 30 Software Development
- 40 Engineering
- 50 Marketing
- 60 Consultants

- 70 Researchers/Educators
- 90 Other (Specify) _____

C. Size of Organization (no. of employees)

- ___ A. Under 100 B. 100-499
- ___ C. 500-999 D. 1,000-4,999
- ___ E. Over 5,000

D. How did you hear about the OEM Business Forum?

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The fee per person: \$295 (\$345 after September 1st), and you can charge it to your American Express, VISA or MasterCard account.

MTI Suggests 3 Good Reasons to Buy a Lear Siegler ADM 32.

**Your Back.
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Your Neck.**

The new ADM 32 was designed for people. It features a detachable keyboard for your back, anti-reflective surface for your eyes and a 10-degree screen angle and optional tilt mechanism for your neck.

In addition to making the operator's work more comfortable and increasing productivity, Lear Siegler's new ADM 32 has all the capabilities of the ADM 31 Intermediate Terminal. That means it includes two full 1920 character pages of memory, visual attributes, and has the option of business graphics. Function keys, complete editing capabilities, self-test and tabbing are also standard features of the ADM 32. It's in stock. MTI is your one source for all the terminals, peripherals, applications expertise and outstanding maintenance and repair service. And our purchase and lease prices are hard to beat. Call MTI today and save.

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Prime and MRP Marketing Package for 50 Series Users

NATICK, Mass. — Prime Computer, Inc. here and MRP Software International, Inc. in Woburn, Mass., are jointly marketing the latter's manufacturing resource planning (MRP) package to users of Prime 50 series systems.

Called MRP System II, the package reportedly integrates modules for both manufacturing and financial functions. The add-on module design is said to allow users to tailor the system to individual needs.

Designed as an interactive, real-time system, the MRP System II package is said to help manufacturers lower inventory costs and improve customer service.

Core features of MRP System II are manufacturing and resource planning, bills of material, inventory

transactions and scheduled receipts, the vendor said.

The Extended MRP Module reportedly offers shop floor control, purchasing capacity requirements planning, routings and work centers and sales order entry.

Work order costing, accounts receivable, accounts payable and payroll functions are available with the Financial Extension Module, the vendor explained.

MRP System II was designed to enable management to work from a common data base that reflects the current status of integrated operations. The software package ranges in price from \$24,000 to \$72,500 for a one-year lease.

Prime Computer, Inc. is located at Prime Park, Natick, Mass. 01760.

Enhanced 'Easyentry' Offered For PDP-11 and VAX-11 Users

CHAPEL HILL, N.C. — Applied Information Systems, Inc. has unveiled an enhanced version of the Easyentry data entry system for Digital Equipment Corp. PDP-11 and VAX-11 processors.

Forms layout, coding, compiling and testing are eliminated with Version 2.0 of Easyentry, the vendor said. Features include a variety of arithmetic calculations, table look-up, field- and form-level help facilities, operator statistics, automatic duplication of fields, batch totals and simplified specification of additional data field attributes. Display features found on many CRT terminals such as reverse video, blinking, color and bold face characters are also supported. Version 2.0 provides a variety of validity checks to insure increased

data accuracy.

Since the data entry code can be shared by all the data entry users, many terminals may be supported using little memory overhead, the vendor claimed.

New Applications

Multiple forms libraries allow new applications to be developed and tested without disrupting existing production work and other applications can coexist on the same system without interference.

Data files are stored in a standard system format and can be used for input to other programs with no modification, the firm said.

Easyentry is supported on PDP-11s and VAX-11s running under RSX-11M, RSX-11M Plus, IAS, RSTS/E and VAX/VMS. A variety of terminals can be used. The software is written in the AID-PL/I language for DEC computers, but does not require the PL/I compiler for operation.

A single-machine perpetual license costs \$4,000 and includes one year of maintenance support.

Applied Information Systems is located at Suite 207, 500 Eastowne Drive, Chapel Hill, N.C. 27514.

Tektronix, HP Units Get Issco Graphics

SAN DIEGO — Integrated Software Systems Corp.'s (Issco) Tell-A-Graf and Disspla graphics software systems have been interfaced to recently announced graphics terminals from Tektronix, Inc. and Hewlett-Packard Co.

The Tektronix terminals are part of the 4110 Series including the TEK 4112 raster scan monochrome display unit and the TEK 4114 display terminal. The HP interface is for the HP2623A, HP's lowest priced graphics terminal.

The base price for the Disspla or Tell-A-Graf system is \$24,500; the proper interfaces for graphics output devices are included at no charge from Issco, which is located at 4186 Sorrento Valley Blvd., San Diego, Calif. 92121.

Consco Users Form Group

BOSTON — At the conclusion of a three-day conference here sponsored by United Brands Co., 40 companies established a users group to share information about Consco Enterprises, Inc.'s Consco Consolidated System software package.

Written in Ansi Cobol for use on IBM, NCR Corp., Digital Equipment Corp. and Hewlett-Packard Co. large mainframes, the Consco Consolidated System reportedly is geared to companies that have operations in diverse locations.

It was designed to automate the major tasks of corporate consolidation with accommodation of local currency and relationships among subsidiaries.

The software package's features reportedly include the ability to handle intercompany eliminations at the level of consolidation that the units have in common.

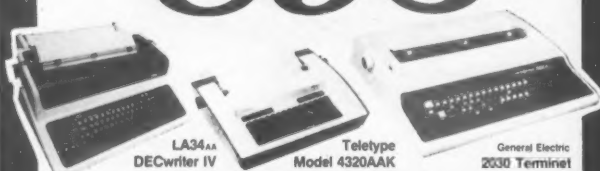
The users group was formed as a clearinghouse for the sharing of experiences and information about the use of the Consco Consolidated System, United Brands said from 1271 Ave. of the Americas, New York, N.Y. 10020.

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Following ADP Partnership Nationwide EFTS Net Taking Shape

By Hal Glatzer
Special to CW

A nationwide network of four electronic funds transfer services (EFTS) has taken shape following a partnership with one Seattle company and the acquisition of another by Automatic Data Processing, Inc. (ADP) of New Jersey.

ADP, the largest service bureau in the U.S. for financial organizations, will eventually provide EFTS throughout the continental U.S. through automatic bank teller machines (ATM), point-of-sale (POS) retail terminals, home computer terminals and telephone bill paying.

With its purchase of Telephone Computing Service, Inc. (TCS) of Seattle, ADP this year acquired the trademark Pay-by-Phone and an existing network of 225 banks, thrift institutions and credit unions in 40 states, whose customers have paid bills and credit accounts over the telephone since 1970. ADP had been operating a TCS-licensed system in Cincinnati.

"Phone bill payment repre-

"There isn't a major market in the U.S. today that doesn't have a commitment to EFTS from the largest commercial banks, thrifts and credit unions. They're doing it through telephone bill-payment; the logical next step is home terminals."

sents a subtle but significant shift in the way people handle transactions," Howard Phillips, founder and president of TCS, said. "They are becoming comfortable with the idea of making transactions through communication, rather than doing it on paper."

"There isn't a major market in the U.S. today that doesn't have a commitment to EFTS from the largest commercial banks, thrifts and credit unions. They're doing it through telephone bill-payment; the logical next step is home terminals," he said.

An ADP spokesman said that his company is currently testing "a very inexpensive" terminal for the home market. When security considerations are worked out, he said, ADP will

also support a variety of other computers and terminals. He also said that ADP will test a pilot program of POS terminals in upscale California retail stores this fall.

The major part of the new EFTS network will come about as a result of a partnership with The Exchange, an independent network of bank ATM's in Washington, Oregon, Idaho and British Columbia, with its headquarters in suburban Bellevue, Wash.

ADP has agreed to pay The Exchange a percentage of new sales over the next four years in return for the use of unified graphics and advertising materials, kiosk architecture, location leases, member-bank contracts and transaction-routing software that The Exchange has

developed. New customers will receive an Exchange card.

The ADP spokesman said his company brings to the network a 70-city data communications system that is presently being upgraded from 300- to 9,600 bit/sec and the installation of five regional transaction-processing nodes, each of which will be equipped with a Tandem Non-Stop 1 communications processor and software from Applied Communications, Inc. of Omaha, Neb. The Exchange, which uses IBM and Sperry Univac processors, is working toward integrating with ADP's system.

Tom Bass, president of The Exchange, considers home terminal services "a loss leader" at the present time, but said "the guys who are going to win are the guys who control financial transactions that are designed to be customer-activated. We have to support all of the products, because if we don't support them now, we'll lose customers later. In four to 10 years it'll be a major part of our product line; of course, the big question is — is it four or is it 10?"

Right now, ADP and The Exchange are putting their efforts toward building a nationwide network of ATMs. Although federal law prohibits true interstate bank branching, The Exchange network operates under a Washington law that permits

(Continued on Page 46)

Burroughs X.25 Software Enhanced

SANTA BARBARA, Calif. — Associated Computer Consultants, Inc. has announced additions to its X.25 software package for large Burroughs Corp. systems that include support of incoming and outgoing terminal calls, host-to-host calls, file transfer within the large systems and the handling of Burroughs TD830-type terminals.

In addition, multiple Burroughs systems can be connected together using leased or direct-connect lines to form a subnetwork of arbitrary topology, the vendor said.

The software will automatically route calls within the subnetwork using X.75 as the pro-

tolocol between the Burroughs machines in the subnetwork.

The package runs on B5900s and all B600 and B7000 series machines using MCP Release 3.1 or 3.2. It costs \$10,000 plus

\$1,000 for installation on a one-time license fee basis and leases for \$350/mo with a \$1,000 installation charge, the firm said from 228 E. Cota St., Santa Barbara, Calif. 93101.

Lee Data Offers 3278 Substitute

MINNEAPOLIS — Lee Data Corp. is offering a CRT terminal compatible with IBM's 3278 and featuring a high-resolution CRT terminal screen.

The All-In-One display also features a nonglare, fingerprint-resistant screen that can be tilted 25 degrees vertically and rotated 180 degrees hori-

zontally, according to the vendor.

Standard screen sizes include 24-line by 80-col, 43-line by 80-col and 27-line by 132-col. These operator-selectable screen sizes are compatible with IBM Models 2, 3, 4 and 5. Two special screen sizes that extend the terminal's 132-col

viewing capacity are the 43-line by 132-col and the 66-line by 132-col sizes.

Sold in a cluster with an IBM 3274-compatible control unit, seven All-In-One displays and a high-speed matrix printer, the system costs \$42,444, Lee said from 10206 Crosstown Circle, Minneapolis, Minn. 55344.

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For Retail Applications

Self-Service Terminal Checks Credit

HOPEWELL JUNCTION, N.Y. — A self-service credit authorization terminal designed for retail applications is available from Cybercorp.

The Model CYB 1000 is controlled by an 8085A-based single board com-

puter and can support up to 44K bytes of erasable programmable read-only memory (Eprom) or static random-access memory (RAM) mixture with the standard unit having 12K bytes of Eprom and 16K bytes of

RAM, the vendor said.

Three full-duplex RS-232 channels are supported for communication with a modem and peripherals. A fourth, half-duplex, optically coupled serial I/O is designed for communication between CYB 1000s within a local network. Thirty-two bits of DIP Switch are included for input of optional information.

The price for the CYB 1000 is \$4,500, Cybercorp said from Robert-Mark Park, Rt. 52, Hopewell Junction, N.Y. 12533.

Ergo 3000 Boasts Seven LEDs

ST. LOUIS — Micro-Term, Inc. has unveiled a CRT terminal with an integrated palm rest and seven LEDs to indicate terminal status. In addition, the monitor module houses a green, nonglare screen and tilts 25 degrees to accommodate any viewing angle.

The Ergo 3000 is code compatible with the Digital Equipment Corp. VT-100 and offers 132-col display, scrolling regions and double high, double wide characters, the vendor said.

Also standard are current loop and a VT52 printer port. Brightness control, enable/disable keyclick and auto-repeat are keyboard selectable.

The unit costs \$2,195, Micro-Term said from 1314 Hanley Industrial Court, St. Louis, Mo. 63144.

Nationwide EFTS Possible

(Continued from Page 45)

Washington and Oregon transactions to pass across state lines.

Since it is The Exchange — and not the banks themselves — that operates the interstate data communication service (with the data in this case being financial transactions),

PE Offers Optic Converter

OCEANPORT, N.J. — The Data Systems Group of Perkin-Elmer Corp. has announced a communications interface for use with the firm's 16- and 32-bit computer systems and RS-232 interfaced devices.

The Single Channel Fiber Optic Converter supports full-duplex asynchronous data communication transmission speeds of up to 19.2K bit/sec over a fiber optic cable at distances up to one mile.

The unit is said to provide a solution for connecting remote RS-232 devices to Perkin-Elmer computer systems in environments where standard wire links would be unreliable. It costs \$2,130 from the vendor at 2 Cresent Place, Oceanport, N.J. 07757.

Codex Modem Out For Limited Distance

MANSFIELD, Mass. — Codex Corp. has unveiled a limited distance modem designed for use with user-owned twisted pair or public telephone data channels.

The 8250 LDSU is capable of operating over distances up to 23 miles at speeds ranging from 2,400- to 19.2K bit/sec, according to the vendor. The modem features an automatic equalizer, remote unattended diagnostics, point-to-point and multipoint operation, status indicators and dedicated on-board dc power supply, the vendor said.

It costs \$750 from Codex at 20 Cabot Blvd., Mansfield, Mass. 02048.

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there appears to be no violation of federal law. By extension, the involvement of ADP will extend the reach of the ATM network to every state except those where local law prohibits certain types of transactions. "For all practical purposes, EFTS is reducing the restrictions that currently prevent interstate banking transactions," Bass said.

No Great Threat

Bass expects that customers will not typically open bank accounts outside their own home state. "Even though EFTS makes it practical, the threat to local banks — stealing their customers away — is not great at this time. A guy just does not walk up to an ATM and open an account. At least for now, EFTS is not distorting the strength of local banks."

But Bass acknowledges that the new First Interstate Bank (actually a holding company covering banks in 11 Western states) is "an incredibly powerful situation," since a customer will be able to recognize them by common graphics and receive comparable services wherever he travels.

"We're going to take the 'one-stop shopping approach,'" Bass said. "Customers will come to us for everything: automated teller machines, pay-by-phone, credit card authorization, point-of-sale and home terminal support. The common thread of graphics and advertising is essential to tie all these things into an integrated system."



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DATAPOINT

Snap-In Toner Cartridge Performs on IBM 3800

MOUNTAIN VIEW, Calif. — A snap-in toner cartridge that acts as a substitute for the IBM 3800 laser printer toner loading system is available from TBS.

The Snap-in Toner Cartridge minimizes operator-toner contact, eliminates the need for machine shutdown during loading and provides cleaner handling and environment, TBS said.

In place of the plastic bags IBM uses to supply toner to the 3800, the snap-in model is a high-impact, polystyrene container. When the cartridge is inserted in a specially designed receptacle, a diaphragm mechanically opens and the toner flows into the printer. The cartridge remains in place and may be used to assist the splicing operation.

The Snap-in Toner Cartridge costs \$140 or \$160, depending on unit size, from TBS at TBS Building, 1050 B. L'Avenida, Mountain View, Calif. 94041.

Control System Combines Switching, Monitoring

HORSHAM, Pa. — A control system said to combine A/B line switching and data monitoring in a single controller has been announced by Digilog, Inc.

The MSC-1200 eliminates the need for a patch cord and allows manual line switching or instantaneous switching under the control of one of 16 discrete preselected-use reconfiguration programs, the vendor said.

Data Briefs

Individual lines are selectable for signal or protocol monitoring and fault isolation and the user can instantaneously reconfigure the resources within his network to accommodate different sets of operation requirements or applications, the company claimed.

The MSC-1200 is priced at \$865 from Digilog, Inc., Babylon Road, Horsham, Pa. 19044.

Communications Analyzer Troubleshoots Serial Data

LINCOLN, R.I. — A data communications analyzer for field service that performs interactive troubleshooting and passive monitoring of serial data associated with the EIA RS-232 interface has been announced by Interna-

tional Data Sciences, Inc. (IDS).

The Hawk 4020 configures interactive and monitoring functions from a menu selection format that displays the various system parameters, the company said.

It can also be configured to transmit or reply to polling messages and interchangeable programmable read-only memories can be reprogrammed to expedite various test set-ups for network parameters, the vendor claimed.

The Hawk 4020 data communications analyzer is priced at \$3,595 from IDS, 7 Wellington Road, Lincoln, R.I. 02865.

Infotron Systems Offers 4,800 Bit/Sec Modem

CHERRY HILL, N.J. — A 4,800 bit/sec multidrop and point-to-point synchronous modem is available from Infotron Systems Corp.

The DL 4800 operates in full duplex over four-wire- and half duplex over two-wire-type 3002 unconditioned lines. The TRS/CTS turnaround time is 50 msec.

The unit is end-to-end compatible with the Bell 208.

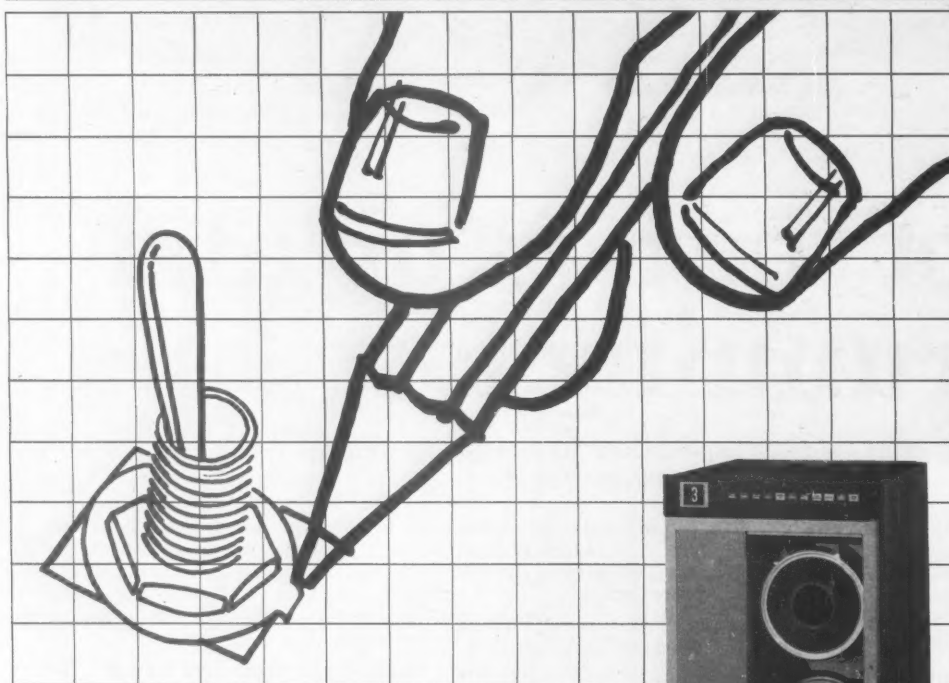
It is priced at \$3,600 in the stand-alone configuration and at \$3,200 when integrated into the vendor's multiplexers, Infotron said from Cherry Hill Industrial Center, Cherry Hill, N.J. 08003.

Mux Allows Single-Ended, Differential User Input

MANSFIELD, Mass. — A series of high-speed analog multiplexers that reportedly allow users to program their inputs for either single-ended or differential operation has been announced by Datal-Intersil.

The MX series allow channel addressing by a three- or four-bit binary code while an inhibit input enables or disables the entire device to permit expansion of channel capacity by connecting several devices together, the company said.

The MX multiplexers are priced from \$19.50 to \$77.50 from Datal-Intersil, 11 Cabot Blvd., Mansfield, Mass. 02048.



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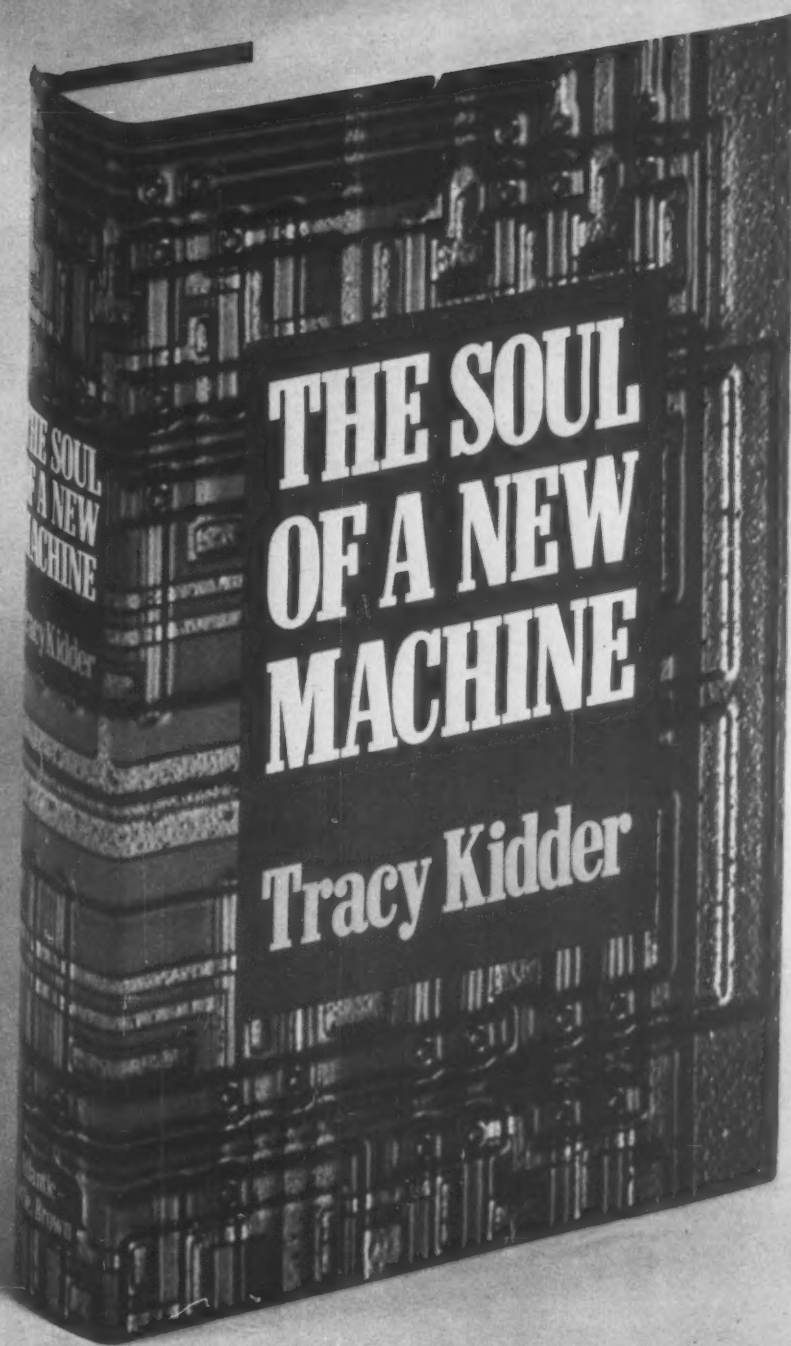
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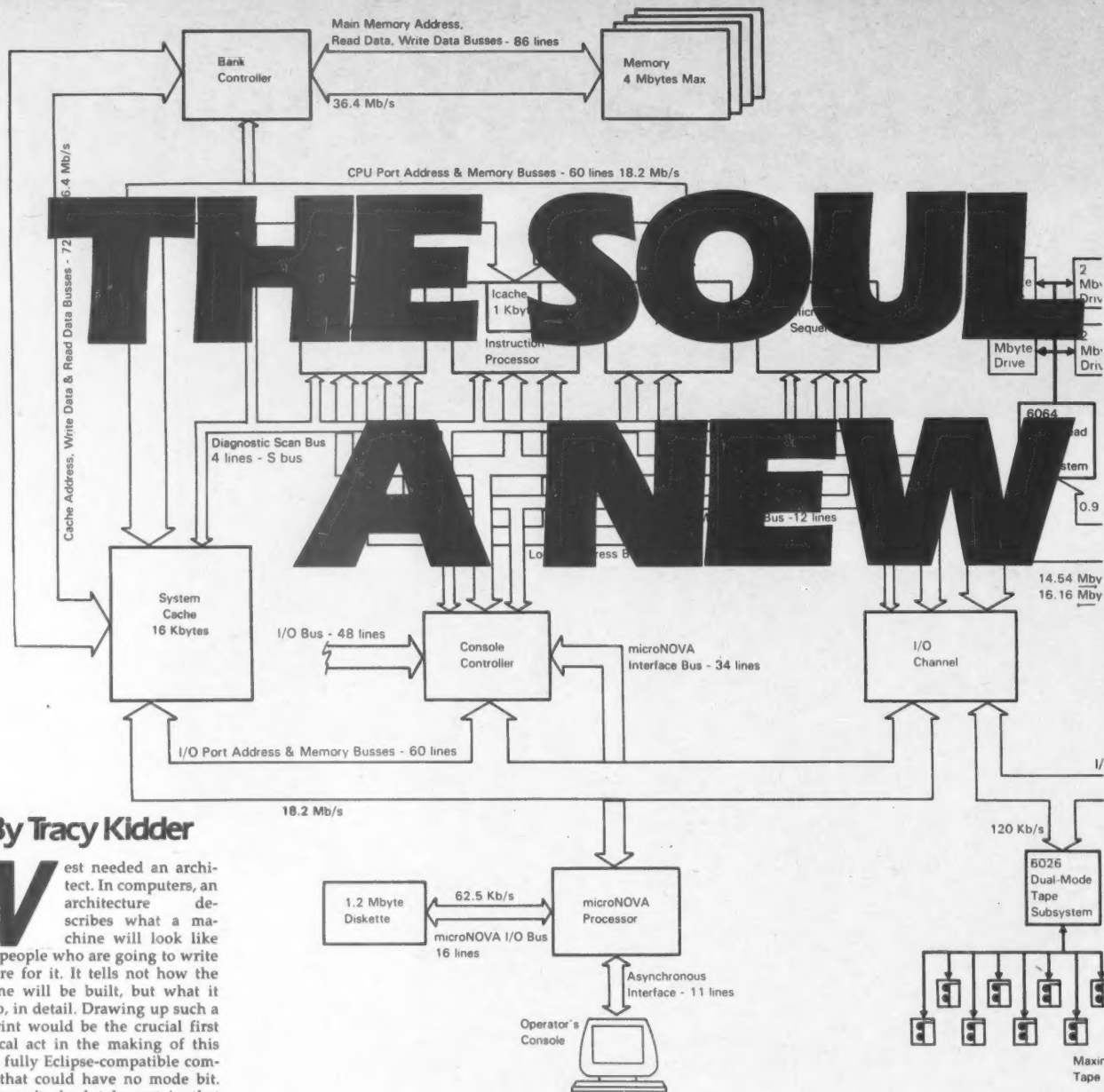
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IN DEPTH

A Special CW Preview



Conclusion of a Two-Part Series



By Tracy Kidder

West needed an architect. In computers, an architect describes what a machine will look like to the people who are going to write software for it. It tells not how the machine will be built, but what it will do, in detail. Drawing up such a blueprint would be the crucial first technical act in the making of this 32-bit, fully Eclipse-compatible computer that could have no mode bit. West wasn't absolutely certain that such a machine could be made. If it could, what would be the best approach? He had no idea, but he thought he knew who would. Right at the start, West decided that a Data General employee named Steve Wallach should be Eagle's architect. "He's the only guy for that job," said West. "The guy's a walking dictionary and encyclopedia of computers. He's the best guy in the world for that job."

Accordingly, West called Wallach to his office in the spring of 1978 and asked him to draw up the architecture for a 32-bit Eclipse.

Steve Wallach glared at West. Wallach got to his feet and, coining a phrase, said: "I'm not puttin' a bag on the side of the Eclipse." Then he stomped out of West's office.

For a time after that, Chuck Holland, an engineer who had been with the team a couple of years, worked on the architecture; he did a

great deal of work and an entirely creditable job, as far as he was allowed to go. To West, however, no one else but Wallach would do. He'd get Wallach to sign up somehow. Wallach, he believed, really did want to work on a 32-bit Eclipse, he just didn't know it yet. West knew Wallach. He figured that as much as Wallach wanted to work with a clean sheet of paper and no constraints, he wanted two other things more. These were tangible success and revenge.

"Engineers want to produce something," said Wallach. "I didn't go to school for six years just to get a paycheck. I thought that if this is what engineering's all about, the hell with it." He went to night school, to get a master's in business administration. "I was always looking for the buck. I'd get the M.B.A., go back to New York and make some money," he figured. But he didn't really want to do that. He wanted to build computers. Wallach spent more than a decade

'A superb book, one that computer engineering has deserved for a long time. I wonder if anyone but another computer hardware writer will ever see all the skill that went into it. All the incredible complexity and chaos and exploitation and loneliness and strange, half-mad beauty of this field are honestly and correctly drawn here. There is no exaggeration. I didn't think a book like this could be done.'

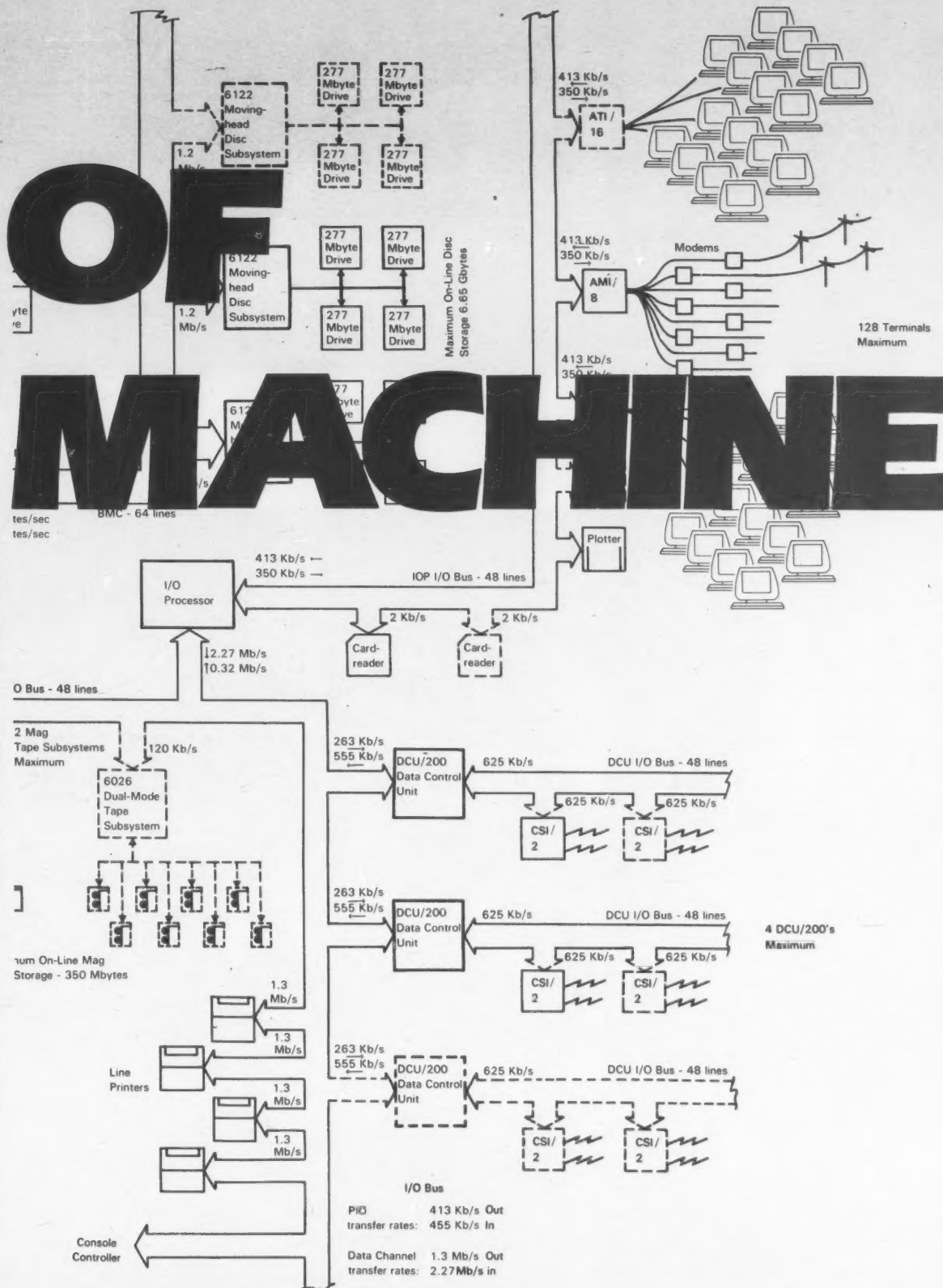
— Robert Pirsig,
Author of *Zen and the Art of Motorcycle Maintenance*

working on computing equipment. He'd had a hand in the design of five computers — all good designs, in his opinion. He had worked long hours on all of them. He had put himself into those creatures of metal and silicon. And he had seen only one of them come to functional life, and in that case the customer had decided not to buy the machine.

The soles of Wallach's cowboy boots faced his office door. He was stretched out in his chair, his feet up on his desk. He was slender, not

skinny, with wavy brown hair that was slicked back but still a little unruly. His complexion was pale, for making computers is an indoor occupation and not much vitamin D got into the basement. He was in his mid-thirties.

Wallach had his own real, if wind-dowless, office down the hall from West's. It was just like West's in its skeleton, but differently adorned. Here, enthusiasm lay under less than strict control. Papers lay all over the flat surfaces. Ferns in pots hung from



Courtesy of Data General Corp.

the ceiling. Stuck with pins to the walls were cartoons, T-shirts, posters, postcards and, over by the doorway, a brown paper bag — a joke, the figurative bag on the side of Eclipse given material shape.

In this situation, Wallach allowed, he was a rough customer. On one of his many visits to North Carolina

during the so-called EGO wars, he was presented with a poster depicting the hideous face of the arch villain of *Star Wars*, Darth Vader himself. "We got this just for you," Wallach was told. He liked to tell that story.

In the EGO wars, Wallach served as West's Hessian. West didn't feel an-

gry toward North Carolina, nor could he afford to appear hostile. But arguments are arguments; certain nasty things had to be said. Wallach was good at saying them and happy to do it. He served, he said afterward, as "West's gun" in the "shootouts."

But in the end, Wallach got beaten. EGO was canceled — not because it

wasn't a good design, but because it was too good, too much of a threat to steal the show from North Carolina. West never fully believed this, but Wallach always did.

When West started talking, after all of that, about building a 32-bit Eclipse, Wallach sneered — partly

(Continued on In Depth/6)

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The HP 125 also offers color graphics capabilities that turn complex data into charts, graphs and transparencies for presentations. And it does word processing, too. It edits and prints everything from reports and memos to high-quality letters and long documents.



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18.75	18.75	18.75	168.75
9.375	9.375	9.375	843.75
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2.34375	2.34375	2.34375	210.9375
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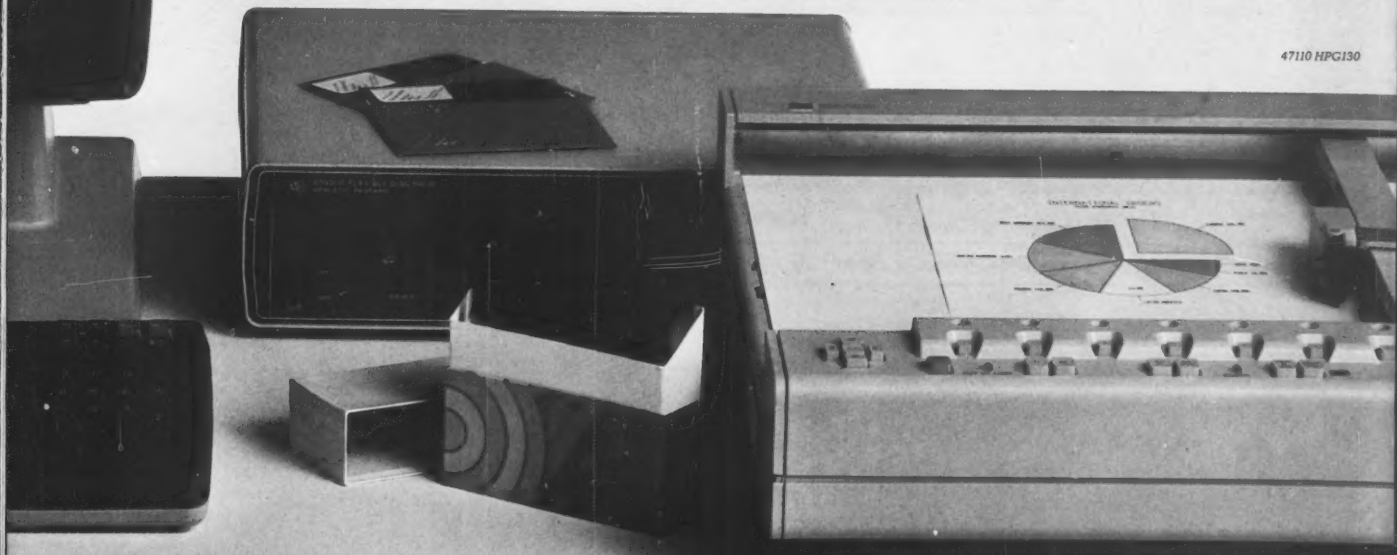
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IN DEPTH

(Continued from In Depth/3)

because it seemed to him that this was just the sort of project that North Carolina would have wished on him: an insignificant, kludgy machine that probably wouldn't get out the door. He'd rather stand in honorable defiance than work on such a thing. He was quitting the fight, he said, and soon he would leave Data General.

Meanwhile, thinking in the fastness of his office, West decided that

he had made a mistake. He had not presented Eagle in the proper light to Wallach. Over the next few weeks, he had many long conversations with the reluctant architect. He listened to Wallach's complaints. He agreed that Wallach had been treated badly.

"But haven't you realized yet that the way to prove someone wrong is to build the right thing?" West asked, time and time again. Finally, somewhat exasperated, but also sus-

pecting that Wallach was ready to yield, West forced the issue. "Either you do this or your job description is inoperative," he said to Wallach one day.

The phrasing appealed greatly to Wallach, and he could see that West was probably right. Conceiving architectures was his job and Eagle was the only project around that needed an architect. But Wallach had seen too many projects canceled in spite of their merits to believe that Eagle

would go out the door just because it promised to be a good commercial machine. He wasn't going that route again. Wallach wanted to talk to de Castro. This was not a completely extraordinary request; de Castro's office, Wallach knew, would usually open for an engineer who had something to say.

As Wallach remembered it later, for those who questioned him about it, this was the gist of his conversation with the president:

"Can I be straight with you?" asks Wallach.

De Castro nods.

"O.K.," says Wallach. "What do you want?"

"I want a 32-bit Eclipse," says de Castro.

"Are you sure? If we do this, you won't cancel it on us? You'll leave us alone?"

"That's what I want, a 32-bit Eclipse and no mode bit."

Wallach returned to West's office, and now, at long last and sniffing, he said, "Okay, Tom, one more time."

"The document's yours," West replied. "You gotta do it fast."

Wallach went to his office and closed the door. Some months later, a careful examination of Wallach's quarters revealed many scuff marks etched in shoe polish low down along his walls, and there was a dent higher up on one wall. These were bruises, left over from Wallach's labor on the machine.

When he sat down, alone, in his office, Wallach reasoned that since the whole purpose of this ridiculous undertaking was 32-bit-hood — the enlargement of the Eclipse's logical-address space from 65,000 to 4.3 billion storage components — he might as

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THE SOUL OF A NEW MACHINE

IN DEPTH

well begin by figuring out how the compartments would be organized ("managed") and the information in them protected. He further decided — he called this "the methodical engineering approach" — to worry about memory management first. Clearing a space on his desk, he placed a yellow legal pad in front of him and drew a picture of a standard 32-bit address — a box containing 32-bits, which looked like this:

12345 → 32

He began to divide up the space inside this box.

If you imagine the computer's storage — its memory — to be a large collection of telephones, then what Wallach was doing might be described as designing a logical system by which phones and groups of phones could be easily identified — a system of area codes, for instance.

Next to Wallach's desk stood several tall metal bookcases. Their shelves from floor to ceiling were stuffed with loose-leaf binders and fat volumes in plain covers that bore titles such as *Parallelism in Hardware and Software: Real and Apparent Concurrency*. The binders contained specifications for nearly every sort of computer ever made and for some that had never been constructed. Wallach called his bookcase "Data General's de facto library." He claimed that he had most of this library in his head. From time to time, he wheeled around in his chair and took a binder down from the bookcase. By the end of the day, Wallach had roughed out the divisions of the standard 32-bit address, and he said to himself: "O.K., great. So far I've done nothing." He gave the wall near his door a kick as he left.

Wallach wasn't ready to admit that he was having fun. But he was back in his office early the next morning. He had a workable general plan for managing memory. Now for the question of how to protect the stored information.

Reinventing the Ring

Many people had taken a crack at solving such problems, notably a group of engineers and computer scientists at MIT who worked with money from the Department of Defense on a project called Multics. In the late '60s, they produced a complex plan for making time-sharing systems secure. It was a clever plan. But many experts believed that no system of protection yet devised could withstand the efforts of smart pranksters or thieves bent on foiling it. One organization had purchased a very fine system for protecting its computerized data banks, but a determined group had cracked it. Pretending to be the manufacturer of revisions to the system's software, they had sent to the organization a bogus set of revisions to the system's software. Without affecting the system's performance, these revisions left

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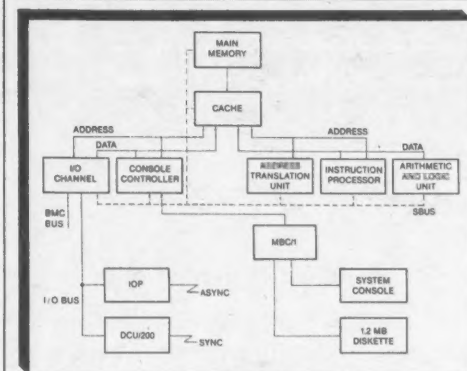
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Overview of Eclipse MV/8000

DG Brings Out 32-Bit Mini More Powerful Than 4341

By Tim Scannell
CW Staff

NEW YORK — A 32-bit minicomputer capable of handling programs 32 times larger than the IBM 4341 can handle was announced here last week by Data General Corp.

Moreover, the Eclipse MV/8000 can handle programs 16 times larger than its nearest competitor — the Digital Equipment Corp. VAX-11/780 — can handle, according to DG claims.

A number of software packages for the Eclipse MV/8000, including an enhanced version of DG's Advanced Operating System (AOS) and three ANSI-standard languages, were also announced by the firm.

The Eclipse MV/8000 marks DG's first venture into the 32-bit computer field and comes after more than two years of experimentation and months of public relations and marketing "hide-and-seek," according to Rowland H. Thomas, DG vice-president of marketing. About 7% of the minicom-

puters shipped are currently 32-bit machines, and that number is expected to more than double by 1983, Thomas said.

Based on very large-scale integration (VLSI), the MV/8000 can simultaneously run both 16-bit and 32-bit programs written under AOS without

(Continued on Page 6)

New Wave Envisioned After 1980 Downturn

By Corinne Winkler

NEW YORK — The new wave in computer technology is not just a fad. It's a revolution. The new wave is the 32-bit machine. The new wave is the 32-bit machine. The new wave is the 32-bit machine.

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Productivity Pegged to Office Automation

By Margaret Zentgraf

NEW YORK — Office automation is the key to improved productivity in the office. The key to improved productivity in the office is office automation. The key to improved productivity in the office is office automation.

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Computerworld, May 5, 1980, Front-Page Story on the 'Eagle'

open a "trapdoor," through which the thieves were able to withdraw important information from the organization's data bank. The anecdote was one of Wallach's favorites. "I'm not gonna try and solve the world's problems here," he conceded. He'd forget about trying to stymie the malicious user and concentrate instead on preventing accidental damage.

Inadvertently, users of a time-sharing system could alter the contents of the host computer's memory and in this way destroy valuable data and foul up system software. Plans such as Multics were workable solutions to this problem.

Wallach was proceeding almost on instinct now. In his two years of work on FHP, he believed, he had

read every published description of every system for protection that had ever been devised. In the ordinary case, an architect might linger over the various possibilities for months. Wallach didn't have time for that, and he really didn't need it. Very quickly, he chose what he believed to be the simplest and best general solution, the general idea that came out of Multics — which DEC, as it happened, had used on the VAX. This was a system of "rings."

With the VAX, DEC's engineers had solved the problems of memory management and the protection of memory separately. Each compartment in memory had an address, and each compartment also had a separate ring number, which was pro-

duced and checked by a special set of hardware. Wallach had studied the specs on VAX. He didn't like that approach.

From the back of his mind came the recollection of a conversation he'd had at a conference of engineers from different companies some years before. At such convocations the usual way of getting acquainted is to ask other engineers what projects they've worked on. Wallach remembered an engineer telling him about a ring system he'd thought up and never built, in which ring numbers and addresses were mingled. Wallach had gotten the fellow to send him a spec; it had looked a little clumsy to him. But there was the

(Continued on In Depth/10)

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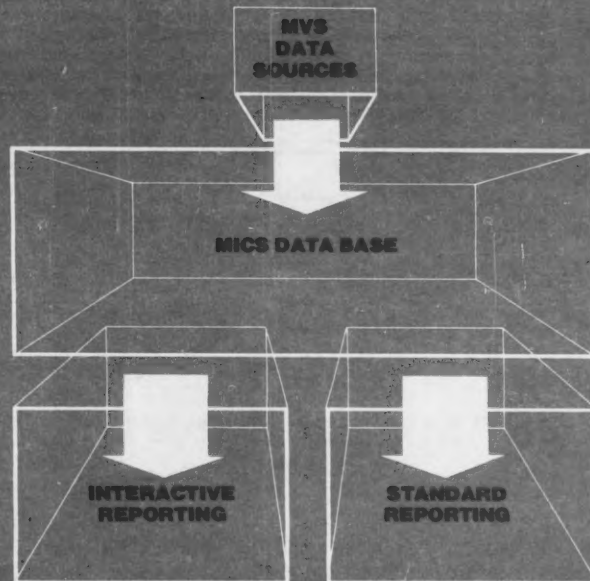
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IN DEPTH

(Continued from In Depth/7)

germ of something there. Wallach drew another diagram of the standard 32-bit address:

1	2	3	4	...	32
segment			address		

The first three bits of the address would contain the segment number of a memory compartment — in the telephone analogy, a given compartment's area code. The other bits would define the rest of the address;

but Wallach wasn't interested in them just now. He was pondering the first three bits. Suddenly, without thinking about it, he was drawing another box below the first box. The diagram now looked like this.

1	2	3	4	...	32
segment			address		
ring number			address		

The segment number — the area code — would be the same as the ring number, which defined the lev-

el of security to which the compartment would be assigned. Three bits can be combined in eight different ways. So there would be eight rings (eight levels of security) and eight segments (eight area codes) in the memory system. The area codes would themselves indicate which ring was forbidden to whom.

Although they are generally shy about claiming to have had one, engineers often speak of "the golden moment" in order to describe the

feeling — it comes rarely enough — when the scales fall from a designer's eyes and a problem's right solution is suddenly there. The chief virtue of Wallach's scheme was its simplicity. It would be relatively cheap and easy to implement in hardware and software, and it should work efficiently and reliably. When Alsing saw Wallach's brief description of the plan, he said to Wallach, "That's nice." Later, out of Wallach's earshot, he said more. "Rings have been around. They're old hat. What makes Wallach a good Data General engineer is that he came up with a really elegant subset of those ideas — simple, sweet, cheap, efficient, clean. And I can't believe I just said that about Wallach."

As for Wallach, after he had drawn the diagram, he stared at it, wondering for a moment, "Where did that come from?"

He kept eyeing it. "That looks pretty cool."

For many months, Wallach would continue to mourn EGO outwardly and to tell anyone who was interested that if some expert asked him someday why he hadn't invented a better instruction set, he would spill the beans. He'd tell them he had been forbidden to use a mode bit. "I'll say it was because I was told that these were management's objectives and I was told that I couldn't work on the machine if I wouldn't fit in with management's objectives."

But in his own mind, he was changing his tune. He was getting to like the looks of this architecture. He was starting to think of it not as a wart on a wart, but as a clean design with a wart on it. The wart was the Eclipse instruction set, virtually every part of which Eagle would have to contain, for the sake of compatibility. But there were some other empty corners of this canvas, aside from memory management and protection — chiefly, the new 32-bit Eagle instructions. Wallach came up with some that he liked a great deal.

In fact, he even found a way to slip in a well-disguised equivalent of a mode bit — which would have allowed him to define a wholly new set of Eagle instructions, ones not at all derivative of Eclipse. But he didn't disguise the mode bit well enough. West found him out. "We're not gonna do that," he said to Wallach. Wallach went back to his office and punched the wall near his door.

But West did let his adjutant put into Eagle some new instructions that weren't Eclipse-like. Not all the ideas for new instructions came from Wallach, but sometimes it worked this way. They developed a routine. Wallach would bring West an idea for a new instruction. West would say that it looked like a win, but that it wasn't Eclipse-like. Wallach knew what that meant. If the wrong people saw this new instruction in the spec, it might cause a stir. People upstairs and in North Carolina might get the idea that Eagle was, after all, intend-

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IN DEPTH

ed as a challenger to FHP — which it certainly was.

So Wallach would take the idea for the new instruction to friends working in System Software, and the system programmers would approve the idea. They and Wallach would sit down and fully define the new, non-Eclipse-like instruction, and then Wallach would ask them to write a memo to the Eclipse Group, requesting that this instruction be put into Eagle. "They wrote the memo," said Wallach, "so that the idea would be perceived as coming from them, just in case we ever got called on it." Wallach went on: "A lot of things we did were unique to that environment. It's clear they weren't always the way things should be done."

Next, all of the instructions had to be defined, as did the precise mechanism by which Eagle would move smoothly, and without the intervention of the user, from programs written for 16-bit Eclipses to ones made for a 32-bit machine. This was a tricky, time-consuming piece of work. Wallach also had to collect all these details and schemes in a document. He took great pains with this volume. He called it "my book," and refining it, rewrote it seven times over the following months. This book was some 200 pages long, and at the beginnings of each chapter he placed a famous or semifamous quotation.

Wallach said he never read technical tracts outside of work and that he shared West's suspicions about people who did. At home, he said, he mainly read *Playboy*. "I read the short stories. I really do! Yeah. I look at the pictures, but I like the stories." He laughed. He had not read widely in the classics. So the epigraphs for his book didn't come to him without effort. He took the quotes from Victor Hugo, Nietzsche, Shakespeare, T.S. Eliot, Santayana and FDR. Some were playful and some downright witty, if you understood the context. At the top of the chapter about the instruction set, for instance, he placed this quote from *Macbeth*:

*We still have judgment here; that we
but teach
Bloody Instructions [Wallach's cap.],
which, being taught, return
To plague the inventor.*

For the chapter about his elegant scheme of memory management, he chose these verses from Tolkien's *Lord of the Rings*:

*It cannot be seen, cannot be felt
Cannot be heard, cannot be smelt,
It lies behind stars and under hills
And empty holes it fills.*

Wallach spent about twenty hours in the Framingham Public Library, with his nose in *Bartlett's Familiar Quotations* and dipping into some of the actual works, just in order to add these flourishes to his spec. They added something. They revealed the

class of feelings that Wallach brought to his job.

If he was a Hessian, he was a passionate one, and with the quotations he signed his name to his piece of the new computer.

Wallach actually spent far more time looking up epigraphs than it took him to discover the right way to manage and protect the computer's memory. But that small golden moment colored everything else for him. As he saw it, the rest of the plan

simply unfolded from that one idea. It was a good omen.

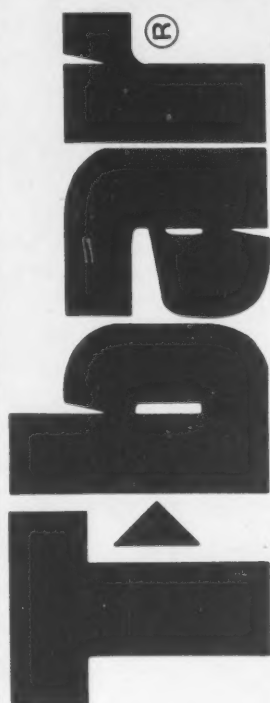
How do such moments occur? "Hey," Wallach said, "no one knows how that works." He remembered that during the time when he was working on the Navy computer for Raytheon — one that got built and then scrapped — he was at a wedding and the solution to a different sort of problem popped into his mind. He wrote it down quickly on the cover of a matchbook. "I will be

constantly chugging away in my mind," he explained, "making an exhaustive search of my data bank."

Flying Upside Down

West often said that they were playing a game, called getting a machine out the door of Data General with their names on it. What were the rules?

"There's a thing you learn at Data General, if you work here for any pe-
(Continued on In Depth/14)



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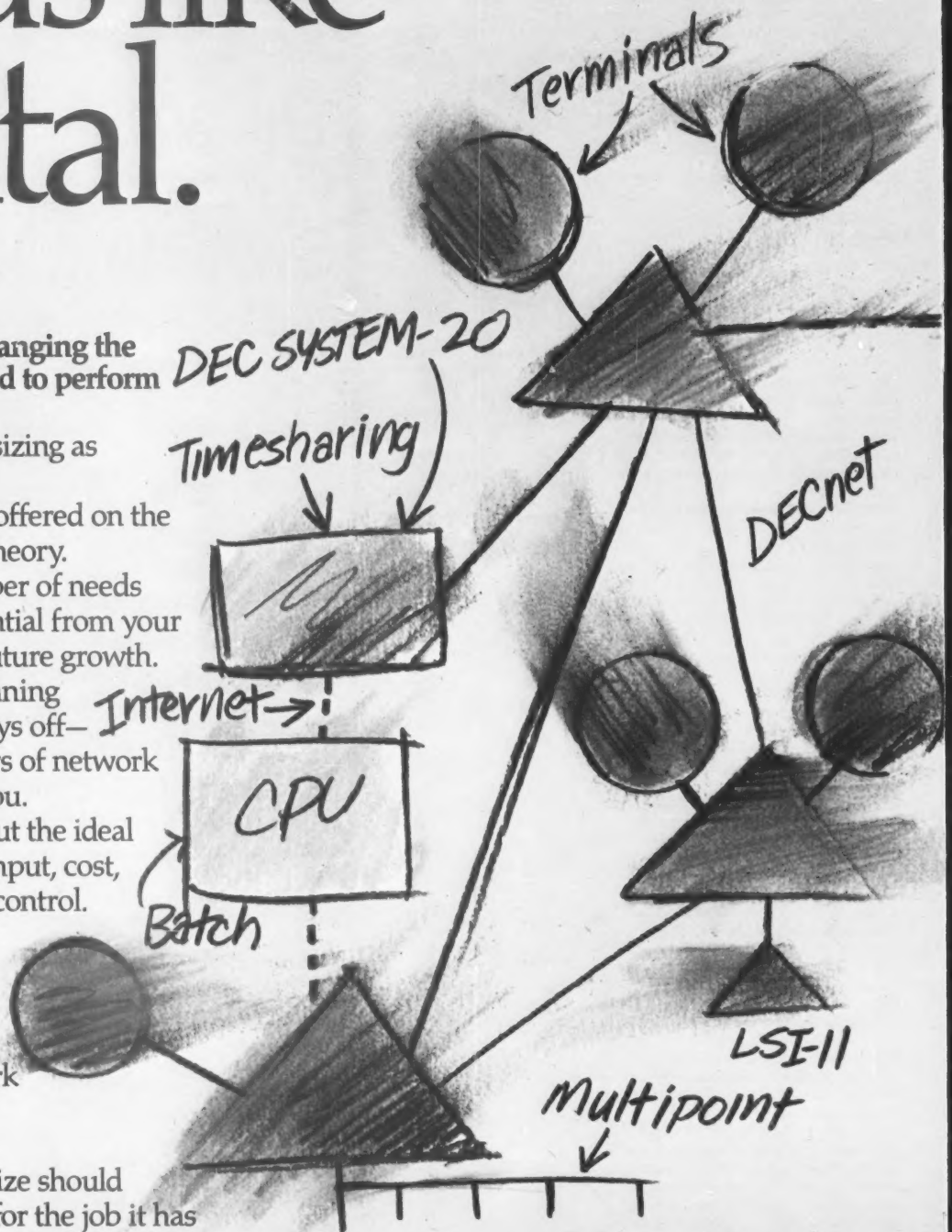
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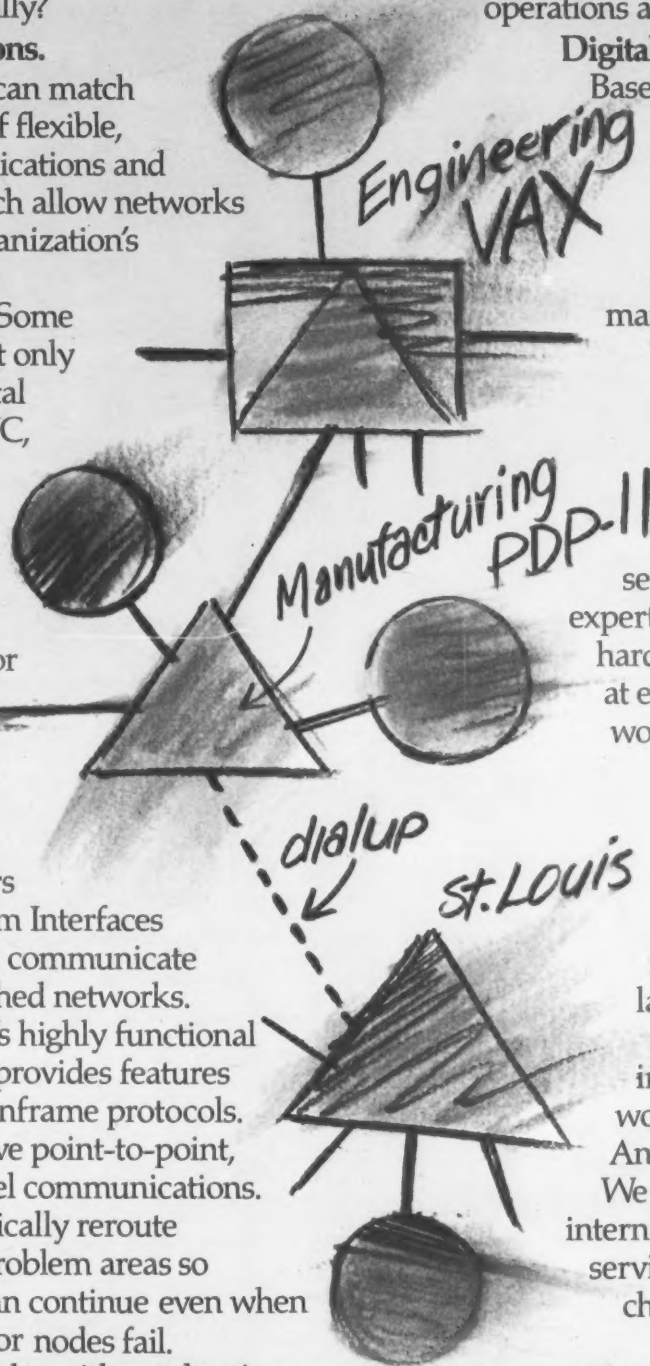
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IN DEPTH

(Continued from In Depth/11)
 riod of time," said West's lieutenant of hardware, Ed Rasala. "That nothing ever happens unless you push it." To at least some people upstairs, this condition took the name "competition for resources." As a strategy of management, it has a long lineage. "Throw down a challenge," writes Dale Carnegie in that venerable bible of stratagems dressed up as homilies, *How to Win Friends and Influence People*.

In a sense, the competition between Eagle and North Carolina was institutionalized; each project lay in the domain of a different vice-president. But that may have been accidental. West's boss, who was the vice-president of engineering, Carl Carman, remarked that he had worked at IBM and that, compared to competition among divisions there, rivalry among engineering teams at Data General resembled "Sunday school." Moreover, Carman said, in a company with a "mature product line" like Data General's, situations naturally occur in which not enough large new computers are needed for every team of computer builders to put one of its own out the door.

"And yeah," Carman continued, "the competition is fostered." He said that de Castro liked to see a little competition stirred up among teams. Let them compete with their ideas for new products, and bad ideas, as well as the negative points of good ones, are likely to get identified inside the company and not out in the marketplace. That was the general strategy, Carman said.

What it now meant downstairs, to the Eclipse Group, was that they not only had to invent their new com-

puter, but also had to struggle for the resources to build it. Resources meant, among other things, the active cooperation of such so-called support groups as Software. You had to persuade such groups that your initial idea had merit and would get out the door, or else you wouldn't get much help — and then your machine almost certainly wouldn't get out the door.

Here's how it looked to West: The company could not afford to field two new big computers; Data General had made a large investment in North Carolina as a place where major computers would be built; and although the Eclipse Group's engineers had good technical reputations, North Carolina's had better ones. The game was fixed for North Carolina and all the support groups knew it.

So West started out by calling Eagle "insurance" — it would be there in case something went wrong down south. Thus he avoided an open fight and thus he could argue that the support groups should hedge their bets and put at least a little effort into this project, too. As for North Carolina's superior reputation, West never stopped suggesting to people around Westborough that their talents had been slighted. His message was: "Let's show 'em what we can do."

"West takes lemons and makes lemonade," observed Alsing.

From the first rule — that you must compete for resources — it followed that if your group was vying with another for the right to get a new machine out the door, then you had to promise to finish yours sooner, or at least just as soon as the other team promised. West had said that the



DG's marketing director and marketing manager demonstrate MV/8000's ability to handle 128 terminals.

Eclipse Group would do EGO in a year. North Carolina had said, O.K., they'd finish their machine in a year. In turn, West had said that Eagle would come to life in a year. West said he felt he had to pursue "what's the earliest date by which you can't prove you won't be finished" scheduling in this case. "We have to do it in a year to have any chance." But you felt obliged to set such a schedule anyway, in order to demonstrate to the ultimate bosses strong determination.

They lived in a land of mists and mirrors. Mushroom management seemed to be practiced at all levels in their team. Or perhaps it was a version of Steve Wallach's ring protection system made flesh: West feeling uncertain about the team's real status upstairs; West's own managers never completely aware of all that their boss was up to; and the brand-new engineers kept almost completely ignorant of the real stakes, the politics, the intentions that lay behind what they were doing.

But they proceeded headlong. Wallach's architectural specification was coming along nicely now. The attempt to turn those ideas into silicon and wire and microcode had begun. Now they had to create a complete design and do it in a hurry.

Carman made it policy that members of the team could come and go more or less as they pleased. These were confident, aggressive young engineers — "racehorses," West liked to say — and they were about to be put under extreme pressure. Carman hoped that by allowing them to stomp out of the basement at any time without fear of reprisal, he would be providing an adequate "escape valve."

At last, by the fall of 1978, the preliminaries were complete. The kids had been hired, the general sign-up had been performed, the promises

suggested and the escape valve established. Then West turned up the steam.

In relatively serene times, some years before Eagle, West and his wife had made friends with an electrician who lived in their town. The man's name was Bernie. He owned a small airplane. Since West's farmhouse and barns lay under one line of approach to the little local airport, Bernie often flew over. When he did, he would waggle his wings. He might do a quick roll; sometimes he'd climb halfway out of his window and wave down at the Wests. "Bernie likes to fly upside down," West remarked, and he and his wife shook their heads and laughed.

Alsing often heard West talk about flying upside down. It seemed to mean taking large risks, and the ways in which West used the phrase left Alsing in no doubt that flying upside down was supposed to be a desirable activity — the very stuff of a vigorous life.

Ed Rasala allowed that West made life in their corner of the basement more dramatic — "definitely more dramatic" — than it usually had to be. But neither Rasala nor Alsing nor Wallach balked when West said that they had to fly upside down now. Over this project loomed the memory of EGO. No one wants to see hard work come to nothing, and EGO was generally accounted a disaster. But it had lasted just a few months and had involved only a few engineers.

About 30 were working on Eagle now. That the project might be tossed on the scrap heap somewhere along the way, after months of 30 souls' passionate labor, was unthinkable. But it could certainly happen, they thought. West had felt that he had to promise to do Eagle in something like a year in order to get the chance to do it. Now he chose to be-

(Continued on In Depth/16)

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THE SOUL OF A NEW MACHINE

In Depth/16

IN DEPTH

(Continued from In Depth/14)

lieve that to get it out the door, they really had to come close to meeting that absurd schedule. At the same time, they had to do it right — right in the commercial sense. The whole project was risky, from the start. In service of the big risk, West under-

was making PALs. But if PALs really were the coming thing, it would be a win to use them. West decided to do so.

West figured that the Eclipse Group had to show quick and constant progress in order to get the various arms of the company increasingly inter-

'Looking for a technical advantage, West gambled that the coming thing in chips was the PAL. Conventional wisdom holds that in making a new computer, you never plan on using any sort of brand-new chip unless at least two companies are making it. At that moment, only one fairly small company was making PALs.'

took on the team's behalf many smaller ones.

"We're always assuming that things'll break right for us," observed Alsing. West was assuming, for instance, that the software resources would be there when they were needed. They were all assuming that youngsters fresh from college could build a major new computer, though none of the recruits had built anything like this before.

Looking for a technical advantage, West gambled that the coming thing in chips was a type of circuit known as a PAL. The manufacture of integrated circuits is a fairly risky business: it is said that factories can suddenly become inoperative for no apparent reason — though a small infusion of dust is a common suspect. So the conventional wisdom holds that in making a new computer, you never plan on using any sort of brand new chip unless at least two companies are making it. At that moment, only one fairly small company

ested in helping out. For public relations, and maybe in order to keep the pressure on his crew, he made extravagant claims. He always pushed them one step ahead of themselves. Before Wallach finished specifying the architecture, West had the team designing the boards that would implement the architecture. Before the engineers cleaned up their designs, West was ordering wire-wrapped, prototype boards. Before the wire-wraps could possibly be made right, he was arranging for the making of printed-circuit boards. And long before anyone could know whether Eagle would become a functioning computer, West had the designers stand in front of a TV camera and describe their parts of the machine. The result of this last act of hubris was a videotaped extravaganza some 20 hours long. West planned to use it, when the right time came (if it ever did), as a tool for spreading the news of Eagle all around Westborough. "Pretty gutsy," he said, with a grin,



CW Photo by J. Rochester

Author Tracy Kidder

nodding toward the shelfful of video cassettes.

One evening West paused to say to me: "I'm flat out by definition. I'm a mess. It's terrible." A pause. "It's a lot of fun."

West established the rules for the design of Eagle and he made them stick. The team should use as little silicon as possible, a mere few thousand dollars' worth of chips. The CPU should fit on far fewer than VAX's 27 boards, and each major element of the CPU should fit on a single board. If they could fulfill those requirements, Eagle would be cheaper to build than VAX. On the other hand, it had better run faster than VAX, by certain widely accepted standards. It should be capable of handling a host of terminals. A CPU is not a functioning computer system; Eagle also had to be compatible with existing lines of Data General peripherals as well as with Eclipse software.

On the Magic Marker board in his office, West wrote the following: "Not Everything Worth Doing Is Worth Doing Well." Asked for a translation, he smiled and said, "If you can do a quick-and-dirty job and it works, do it." Worry, in other words, about how Eagle will look to a prospective buyer; make it an inexpensive but powerful machine and don't worry what it'll look like to the technology bigots when they peek inside.

West espoused these principles of computer design: "There's a whole lot of things you've gotta do to make a successful product. The technological challenge is one thing, but you can win there and still have a disaster. You gotta give 'em guidelines so that if they follow them, they're gonna be a success. 'Do ABC and D

without getting the color of the front bezel mixed up in it.'" Another precept was "No bells and whistles." And a third: "You tell a guy to do this and fit it all on one board, and I don't want to hear from him until he knows how to do it."

West reviewed all of the designs. Sometimes he slashed out features that the designers felt were useful and nice. He seemed consistently to underestimate the subtlety of what they were trying to do. All that a junior designer was likely to hear from him was "It's right," "It's wrong," or "No, there isn't time."

To some the design reviews seemed harsh and arbitrary and often technically shortsighted. Later on, though, one Hardy Boy would concede that the managers had probably known something he hadn't yet learned: that there's no such thing as a perfect design. Most experienced computer engineers I talked to agreed that absorbing this simple lesson constitutes the first step in learning how to get machines out the door. Often, they said, it is the most talented engineers who have the hardest time learning when to stop striving for perfection. West was the voice from the cave, supplying that information: "Okay. It's right. Ship it."

In fact, the team designed the computer in something like six months, and may have set a record for speed.

Excerpted from *The Soul of a New Machine* by Tracy Kidder. © Copyright 1981 by John Tracy Kidder. Used with permission of the author and Atlantic-Little, Brown. The book is scheduled for publication Aug. 26 and should be available in your local bookstore. For more information contact Jess Brallier, Trade Sales Promotion Manager, Little, Brown & Co., 34 Beacon St., Boston, Mass. 02106.

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Allied Chemical Brews New CPU Mix

Special to CW

MORRISTOWN, N.J. — Allied Chemical Corp., the diversified Fortune 500 company based here, has undergone a startling and fast-paced corporate metamorphosis in the past two years — a major reorganization saw the consolidation of eight divisions into three operating companies; the firm acquired a fourth company, Eltra Corp., and it streamlined its corporate staff.

Part of this corporate revamping was restructuring of the firm's DP department.

In keeping with the belt-tightening and restructuring spirit, the company more than doubled its computing capacity by adding an Amdahl Corp. 470V/5 computer to its IBM 370/158-based system.

"The average turnaround time for a single batch job used to be 49 minutes," said Kenneth P. Garby, manager of computer operations. "Turnaround time with the 470V/5 averages 26 minutes. In other words, the new computer can handle double the work load."

Outgrowing Capacity

Prior to reorganization, the Corporate Data Center in Morris Township, N.J. (now part of the chemical company), was responsible for providing DP services to most Allied user departments. Although the data center then had two IBM computers, a study indicated that the steady increase in work load would soon outgrow the capacity of the existing systems.

"We began to look for a new computer which would be cost-effective and maintain satisfactory user service levels," Garby said. "We evaluated several computer systems against criteria such as reliability of hardware and software, vendor support, future expansion capability, compatibility with other equipment, vendor stability, initial price and ongoing cost."

According to Garby, Allied finally chose the Amdahl 470V/5 because of lower initial cost. The computer was purchased from Continental Information Systems Corp., a leasing company, at a price considerably lower than would have been paid for a new computer.

The Amdahl 470V/5, with 4M bytes of memory and eight channels, is used for all batch, remote job entry and on-line systems. Support activities are provided by an IBM 370/158-3. Control units can switch any of 50 communications lines to either computer when necessary.



On-line terminals allow Allied Chemical's employees to keep track of some 6,000 rail cars that the company uses to transport chemicals.

Both computers share eight IBM 3350 disk drives, six 3330-11 disk drives and 15 3420 tape drives. Allied uses the V/5 in the batch, remote job entry and on-line modes and for some rather unusual applications, such as a rail car control system.

According to Louis P. Esposito, Allied's manager of systems development, the system has approximately 6,000 rail cars, both owned and leased, that are used to ship chemicals. "Our main concern is that these cars keep moving, that they are not being used for portable storage or sitting on the side of a track. Our control system enables us to track the car across the country day by day. In the long run, it is much more profitable to manage your cars."

Managing Begins

The managing begins when the plant, via on-line input to the V/5, reports that a car has been shipped. As the car progresses on its journey, sensors at specific points read the car number and relay the information directly to the railroad's computer. At the end of each day, the railroads provide Allied with the most recent location data via regular telephone lines. During the day, plants report the arrival of empty cars directly into the V/5. Car con-

trol specialists in Morristown also use on-line input for corrections and trip update information.

Of course, the computer is also used for typical DP applications, such as accounts receivable, accounts payable, general ledger, payroll, order processing and management reporting.

The direct order processing system is run on-line. Orders are taken over the phone by a customer service representative, who determines the availability of a product and advises the customer of the delivery date. The order is entered via the terminal into the computer, which then produces all shipping documents at the plant. The plant completes the shipping data via on-line transactions. The order processing system serves 30 to 40 plants daily.

In a batch mode at the end of the day, a customer invoice is prepared for all orders flagged as shipped. The invoice is directed to the accounts receivable and sales data collection system.

According to Esposito, the V/5 also supports 13 to 14 plants with a stores inventory management system. The data base for this system contains a list of all items required to keep a plant functional, from screws to major pieces of equipment.

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NCR Marking System Out For Retail Organizations

DAYTON, Ohio — NCR Corp. has announced the 7520, a stand-alone receiving and marking system for retail organizations.

The desktop processor includes NCR's recently introduced 6448 optical character recognition (OCR)-A tag and label reader. It can combine merchandise and receipt records along with printing merchandise tags, the vendor said.

In a distributed processing environment, the 7520/6448 supports IBM 2780/3780 batch bysynchronous transmission over dial-up or leased lines at 2,400- or 4,800 bit/sec and at 9,600 bit/sec for in-house modems transmission, the vendor said.

The processor is capable of driving up to four 6448 OCR printers and can simultaneously store merchandise receipt data on flexibe disks, the vendor said.

The 7520 can perform editing, arithmetic and validating operations as it is entered with the NCR Basic +6 Interpreter. The system can also be programmed to process other types of low-volume applications when it is not being used for receiving and marking, the vendor said.

The 7520 costs \$10,910 and the 6448 costs \$8,200. The Basic +6 Interpreter costs \$800, or \$35/mo, the vendor said from its corporate headquarters, Dayton, Ohio 45479.

Raster Scan System Boasts 64K-Byte RAM-Based Image

TROY, N.Y. — A raster scan graphics display system said to offer software-selectable point addressability and 64K-byte random-access memory (RAM)-based image has been announced by Raster Technologies, Inc.

The Model One features extensive graphics commands and a dual mode image array selection, either 512 by 512 pixels or 1K-byte by 1K-byte addressable points so users can perform both imaging and full-screen line drawing tasks on the same display monitor, according to Raster Technologies.

The system also features a 16-bit Z8000 central processor, a high-speed hardware vector processor that off-loads iterative line-generation

commands, an optional direct pixel memory access port and an optional overlay plane for alphanumeric data, the company said.

With shipments beginning next January, the Model One tabletop controller is priced at \$10,800 from Raster Technologies, Inc., 110 Eighth St., Troy, N.Y. 12181.

Bits & Pieces

Memory Tester HCC Bows

EL TORO, Calif. — Carlton Industries, Inc. has announced a host computer controller (HCC) option for its Model C12 tabletop memory tester. The option allows the user to control the memory tester with the processor of his choice.

The HCC option features RS-232 or IEEE-488 interfaces, control over environmental parameters, data logging functions and memory board testing capabilities, the vendor said.

The C12 is normally supplied as a turnkey system and costs from \$27,900. The HCC option costs \$5,250; the vendor said from 22661 Lambert St., El Toro, Calif. 92630.

CAD/CAM Service Offered

SEATTLE — The CAE Technology Center has announced a computer-aided design/computer-aided manufacturing (CAD/CAM) technology overview service called "Executive Summary."

The service presents engineers, architects and manufacturing executives with reports on the payback potential of CAD/CAM. The reports can be used in training, technology research and industrial documentation applications, the vendor said.

The service costs from \$295, the vendor said from Suite 305, 3429 Fremont Place N., Seattle, Wash. 98103.

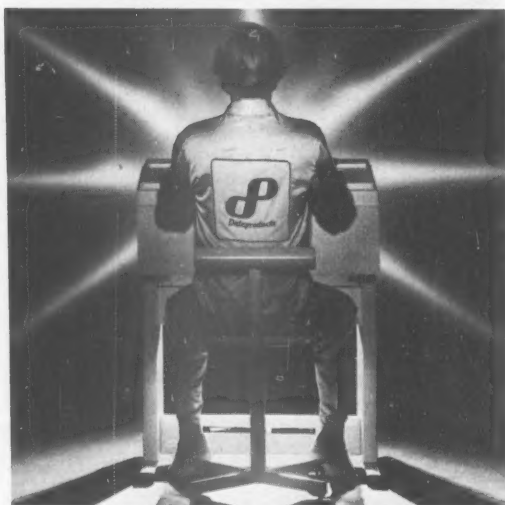
Disk Data Eraser Unveiled

SANTA CLARA, Calif. — Inmac Corp. has announced a magnetic media data eraser called Named Data Strike that can be used for tape, flexible disk, cassette or cartridge units.

The device is said to prevent data loss from background noise on previously used media, the vendor said.

The eraser costs \$69, the vendor said from 2465 Augustine Drive, Santa Clara, Calif. 95051.

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Mini Bits

Turnkeys Target Medical, Contracting Applications

DAYTON, Ohio — Reynolds and Reynolds Co. has announced two turnkey computer systems for medical and contracting applications. The move marks a change in the firm's policy of making systems only for the auto industry.

Called the Expansion 6000 series, the two systems are fully integrated and include hardware, software, maintenance and business forms, according to the vendor's spokesman.

The systems cost \$35,872 each from Reynolds and Reynolds Co., through P.O. Box 1005, Dayton, Ohio 45401.

Qantex 401 Users Get Interface

HAUPPAUGE, N.Y. — North Atlantic Industries, Inc. has announced a controller interface for its Qantex 401 cartridge tape drive said to make the operating transport fully software compatible with Digital Equipment Corp.'s PDP-11 and LSI-11 and Data General Corp.'s Nova computers.

The Model 401 uses read-after-write recording heads that provide bidirectional tape operation to avoid rewind time, the vendor said.

The 401 interfaces are priced from \$2,200 to \$2,750 from North Atlantic Industries, Inc., 60 Plant Ave., Hauppauge, N.Y. 11788.

Xebec Offers S1410 Controller

SUNNYVALE, Calif. — Xebec Co. has announced a controller for Segate-compatible 5¼-in. drives.

Called the S1410, the controller is contained in a circuit board and incorporates very large-scale integration technology, the vendor said. The unit is compatible with Data Technology Corp.'s DTC 510 and Shugart Associates, Corp.'s SA1400 series host interfaces, the vendor said.

The unit costs \$295. More information is available from Xebec Co., 432 Lakeside Drive, Sunnyvale, Calif. 94086.

D3000 Video Repair Course Out

WOODLAND HILLS, Calif. — Pertec Computer Corp. has announced a videotaped repair program for its D3000 line of disk drives.

Called the Video Learning System, the 16-module program is available in VHS, Betamax or ¾-in. formats. The program is self-paced and can be used to train any number of employees, the vendor said.

The course costs \$4,500; a similar course will be available for the T8000 tape transport, a Pertec spokesman said from 21111 Ervin St., Woodland Hills, Calif. 91367.

Point 4 Tops Off 16-Bit Line With Processor That Boasts 32-Bit Instruction Capability

IRVINE, Calif. — Point 4 Data Corp. last week topped off its Mark III and Mark V line of 16-bit minicomputers by introducing a system that reportedly performs a variety of functions as 32-bit instructions.

The firm also increased its thrust into the end-user marketplace by unveiling an interactive turnkey system that manages projects from the initial planning to the postproject analysis stages.

The newly introduced Mark VIII minicomputer system features an expanded instruction set said to give it as much as 100% more performance than the Mark V, the firm's previous top-of-the-line model. In fact, the Mark VIII is aimed to compete with low-end Data General Corp. Eclipse processors, whereas the Mark V and Mark III are targeted against DG's Nova 4, according to John Mather, Point 4's vice-president of marketing.

Like its predecessor, the Mark VIII provides a high-speed central processor and 128K bytes of main memory on a single printed circuit board. It resides in a seven-slot chassis that accommodates a variety of peripheral controllers, such as the firm's multiplexer and Lotus disk controller.

Firmware Instructions

However, unlike the other two machines, the Mark VIII incorporates an extensive set of firmware instructions that replace functions previously implemented in the Iris operating system. By implementing functions in firmware, the time required to fetch an instruction is effectively reduced from 400 nsec to about 100 nsec, Mather said.

The macroinstructions developed for the computer include a subset of two-word instructions, so although the system's address bus is still 16-bits wide, the CPU can perform a variety of functions as 32-bit instructions. Since each firmware instruction is 80 bits wide, and standard software instructions are 16 bits wide, the system can perform more functions in a single instruction step, Mather noted.

Some of the other nearly 2,000 firmware instructions implemented on the machine include: literal byte compare, which allows users to compare a value in an accumulator with a literal byte; literal byte access; extended load and store; and block move, which permits users to move blocks of words anywhere in memory.

Although many of the Iris' operating system's instructions have been implemented in firmware, Mather made it clear that the firm intends to fully support the Nova instructions set of its two other computers.

As evidence of this, Mather noted that software programs are transparent among the three computer systems, and the Mark V can be upgraded to a Mark VIII by adding an operating system driver.

Parallel Communications

While the Mark VIII is not targeted for distributed processing applications, the computer can communicate in parallel with a second Point 4 processor at memory access speeds over the firm's high-speed interprocessor bus. The communications are meant for very small distances — usually within the same area — and accomplished at transfer rates of about 5M byte/sec, Mather said.

Currently, the Mark systems utilize the business Basic and Assembler languages, but toward the end of the year the company plans to add both Pascal and Cobol to the computers' language repertoire.

The Mark VIII costs about \$10,700, with OEM discounts available, and is scheduled to begin deliveries in mid-November.

At the moment, about 99% of Point 4's computer business is accomplished through systems houses. However, the firm hopes to increase its push into the direct end-user sales market, particularly to corral the Fortune 500 companies that seem to prefer to do business directly with a vendor, Mather explained.

Campaign Flagship

The flagship of this end-user campaign is 4Site, a turnkey project management computer that allows managers to spot project delays or changes in priorities, make projections and experiment with various resource allocations. The system uses both the low-end and mid-range Mark systems. The 4Site 300 incorporates the Mark III processor with 64K bytes of memory and handles up to three concurrent users. The system also includes a four-port multiplexer, a 200 line/min printer and a minimum 16M bytes of on-line data storage. The 4Site 500 has the Mark V processor with 128K bytes of main memory, supports up to 16 users, includes an eight-port multiplexer, a 300 line/min printer and 32M bytes of on-line data storage, Mather said.

Both systems use Point 4's Readinet project control software that is used in combination with Pert/CPM, a cost and resource allocation package developed by Mather.

The minimum 4Site 300 costs \$28,500 while the basic 4Site 500 configuration is \$65,500. Point 4 is located at 2569 McCabe Way, Irvine, Calif. 92714.

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Series 3000 Offers 4K Bytes Prom Micro Five Adds CPU, Terminal

IRVINE, Calif. — Micro Five Corp. has announced the Series 3000 small business processor as well as the V-2000 CRT terminal.

The Series 3000 is a 16-bit processor that offers 128K bytes of random-access memory, up to 1M byte of main memory, 4K bytes of programmable read-only memory (Prom), automatic error detection and up to 11 RS-232 asynchronous ports. The unit can support terminals and printers in remote locations and will operate with a 10M- or 34M-byte Winchester disk drive.

The Series 3000 can support a 13.2M-byte optional tape drive or a 13.2M-byte magnetic tape cartridge. A 1.2M-byte double density diskette and a 20M-byte external Winchester disk drive are also available, the vendor said.

A variety of application programs are available for the processor including general ledger, accounts payable, order entry, shipping and invoicing, the vendor said. The base price for Series 3000 is \$18,000, the vendor said.

Also announced was the V-2000

display terminal. The unit features a 12-in. diagonal screen, two pages of display memory, a keyboard and six by eight dot matrix.

Functions include editing features, buffered print and print transparent features, the vendor said.

The terminal provides 20 program-mable functions with 256K bytes of memory for screen formats. Optional features include normal or reverse video formats, the vendor said.

The display unit starts at \$1,500, the vendor said from 17791 Sky Park Circle, Irvine, Calif. 92714.

CM Technologies Micro Runs With PDP-11

PALO ALTO, Calif. — CM Technologies, Inc. has announced CM-16/DS1, an eight-bit microprocessor that can be attached to Digital Equipment Corp. PDP-11 processors.

The development system consists of the firm's 68000 CPU board, firmware, a serial I/O board and cabling for communications with the PDP-11 from an operator terminal and a nine-slot Multibus card cage with power supply and protective enclosure, the vendor said.

The unit comes in two configurations. It can be used as a pass-through system connecting the CRT terminal and a host PDP-11. Programs can be down-loaded to the 68000 and the unit can serve as a preprocessor for

the PDP-11.

The system can also be used as a back-end processor by being connected to the PDP-11 through a separate high-speed port.

Intersil Offers Memory Module

SUNNYVALE, Calif. — A 512K-byte memory module that uses industry-standard 64K-byte dynamic random-access memory (RAM) devices has been introduced by Intersil, Inc.

The MCM-512 card will operate with both 8-bit and 16-bit Multibus-compatible microcomputer cards, with refresh automatically implemented by on-board circuitry, the

vendor claimed.

A 68000 cross-assembler is provided on 8-in. disk drives in a DEC RT-11 format. The CMS-16/DS1 costs \$6,995, the firm said from 525 University Ave., Palo Alto, Calif. 94301.

vendor claimed.

The module systematically detects and corrects all single-bit errors without interrupting the system and modifies the processor of all double-bit errors, the company claimed.

Available with 128K-, 256K-, or 512K bytes of memory, the MCB-512 is priced from \$1,593 to \$5,295 from Intersil, Inc., 10710 N. Tantau Ave., Cupertino, Calif. 95014.

Interface Out For Micro Users

ONTARIO, Calif. — A module that allows a microcomputer-based system to interface with two mini floppies and a printer has been announced by General Micro Systems, Inc.

The GMS6519 offers eight programmable input/output lines, 1MHz or 2MHz base address and enable/disable switches. An optional 4K-byte operation system allows the user to load and save object and source files from a disk, read and write files to a disk, access a directory list, rename files and delete and recover files.

The GMS6519 is priced at \$246 from 1320 Chaffey Center, Ontario, Calif. 91762.

Disk Controller Runs With North Star Gear

BROOKLYN, N.Y. — HSC Computer Services Ltd. has announced the Phase Lock II, a North Star Computers, Inc.-compatible disk controller that handles both double- and quad-density disk drives.

Other features include execution of programs designed for a North Star controller, support for up to four drives and a boot-up option for selectable addresses, the vendor said.

Units cost \$450 and are available with a multiaddress option for \$500, the vendor said from P.O. Box 43, Brooklyn, N.Y. 11236.

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Potential \$400 Million

Bill Would Fund Small Firms for R&D

By Marcia Blumenthal

CW Staff

WASHINGTON, D.C. — A bill recently introduced in the U.S. Senate has the potential of making \$400 million a year available to small high-technology firms to test the commercial worth of their innovative technologies.

The Small Business Innovation Research Act (S. 881) has already gained the backing of more than 80 senators. It spurred the filing late last month of four companion bills in the House of Representatives, the most widely known of which is the Smith-Mitchell bill.

If passed, this legislation would require major science-oriented agencies to set aside 1% to 3% of their research and development budgets to fund research for small high-technology companies.

However, the Reagan administration has expressed little enthusiasm for the proposed legislation, and major universities are bound to oppose the bill because their research facilities stand to lose some funding that will be funneled off to small firms.

Important Feature

While science agencies have funded private firms before, that research has been narrowly focused on procurement of specific agency needs. The current proposed legislation would permit funding for testing the general commercial feasibility of high-technology products, explained LaVon French, legal counsel to the House Small Business Committee.

"The most important feature of the proposed legislation is that funding is for the commercial application of ideas," she said.

The proposed bills, as French put it, are ideas whose time has come — they are the outgrowth of the recognition of the need for government to spur innovation in private industry, an undertaking stressed during the Carter administration.

NSF Program

The National Science Foundation (NSF) grant program is a model for the programs proposed by the various bills. About 12.5% of that agency's applied research money goes to small businesses, French noted.

The proposed legislation, which will have hearings in various congressional committees during the week of Sept. 14, fills the gap between the idea testing and prototype building phase of a company and the point at which venture capitalists step in, she added.

Under the provisions of the legislation, agencies would fund high-technology companies in two phases. The first

would be a small grant of up to \$50,000 to demonstrate the potential commercial feasibility of an idea.

The second phase could permit funding in the \$500,000 range for the building of the product.

Right now the majority of U.S. R&D funding is going to universities and research laboratories where emphasis is on publishing the results of research. This research is then picked up and commercialized on by the Japanese and West Germans, French charged. These nations then sell to the U.S. products that were actually innovated here.

In general, federal agencies do not like mandatory set-asides

and point to the voluntary nature of past R&D funding programs. The Senate bill, sponsored by senators Warren B. Rudman (R-N.H.) and Lowell P. Weicker (R-Conn.), reportedly calls for a set-aside of two-tenths of 1% of R&D funds in 1982 and 1% in 1984.

The 15 major science agencies receive a cumulative R&D budget of about \$4 billion, so potentially \$400 million could be awarded to small businesses, many of them electronics and computer firms. As defined by the government, a small business is one with less than 500 employees, not owned by another corporation and not having a dominant position in its market, French said.

"If you get three winners from an investment of \$400 million, what is returned to the economy in terms of jobs would easily pay for the whole program," she emphasized.

The NSF program started in 1977 has had about 1,000 proposals submitted, of which 200 have been selected for Phase 1 funding and about 12 for Phase 2 grants. This program has the respect of high-technology firms because the grants are reviewed by panels of experts. However, the NSF program's funding is drying up, she said.

What other agencies would do to establish review committees for screening proposals is unclear at this time.

Restrictions on Foreign Investment Seen Choking U.S. Sales Overseas

WASHINGTON, D.C. — Restrictions on international investment are choking overseas sales of U.S. electronics companies, a Data General Corp. executive told Congress recently.

Trying to elevate international investment in Reagan administration trade policy considerations, DG Vice-President Rowland H. Thomas Jr. told a Senate subcommittee late last month that the electronics industry is encountering increasing problems establishing subsidiaries abroad.

"For us, the fact of the matter is that we can't trade in world markets unless we invest abroad," he said in testimony before the Senate International Economic Policy Subcommittee on behalf of the American Electronics Association.

"In order to sell computer systems or other high technology products to customers overseas there must be a commitment — made by us — to provide service and maintenance for the products we sell," Thomas continued. "We must have the ability to establish local subsidiar-

ies for these purposes."

Thomas, DG vice-president for the Americas/Far East, complained a number of countries have adopted "a variety of policies, formal or informal," to restrict foreign direct investment.

"For young companies such as ours, the most onerous of these are restrictions on our ability to establish local, majority owned sales and service subsidiaries," Thomas said. "Because technology is our stock in trade, we are not willing to hand it over to a third party. To do so would severely dampen our future."

Tenuous Position

Because business practices in foreign countries are often very different from those in the U.S., "even with the optimum drafting of agreements, the American minority shareholder is still left in a rather tenuous position," he explained.

"Having control over ones operations, being able to react promptly to opportunities and not having to clear routine administrative matters with a majority partner who may be unfam-

iliar with the overall business objectives and market conditions are all reasons why companies can accept ownership restrictions only at great cost," according to Thomas.

The DG executive said the issue is one well known in industry, but not often brought to public attention, remarking, "companies do not complain openly because they fear retribution."

"For years they have had to grapple with investment restrictions on their own, due in large measure to the lack of an aggressive U.S. policy. In some countries, firms have been able to negotiate agreements, often skewed in favor of the host nation, but which at least gave them some limited access."

"These arrangements," he continued, "are something less than secure and subject to change at any moment. Because they are so tenuous, most firms are reticent to be identified publicly with any criticism of the governments involved."

Thomas mentioned Latin

(Continued on Page 55)

American Express Becomes Vendor

NEW YORK — American Express Co. will provide financial institutions with a wide selection of on-line, point-of-sale authorization terminals to facilitate the approval of merchant transactions not only for American Express cardholders, but also for holders of Visa, Mastercard and Diners Club credit cards.

The firm's move is further evidence of a growing trend in which large computer users are becoming vendors. Aetna Life and Casualty Co. recently agreed to sell more than 1,000 IBM Series/1 minicomputers to its independent insurance vendors by 1985 [CW, April 20].

The American Express program was designed as a low-risk, low-cost way for financial institutions to offer point-of-sale services to

their merchant customers. The program will also help these institutions reduce telephone volume and limit credit and fraud losses, the firm said.

Under the program, banks can choose from a broad range of dial-up or leased line terminals on an as-needed basis. The financial institution purchasing the service from American Express determines the appropriate service level for its merchant clients, sets the fee for the service and can identify the terminal with its own logo.

American Express provides the installation, maintenance and merchant training.

A special 24-hour toll-free telephone number has been set up and in most cases service can be dispatched within 18 hours, the firm said.

NonStop™ Hardware

2

Number two of a series
A Unique Multiple Processor Link

The overall goal: a true high availability system with no single point of failure;

i.e., NonStop® operation in an on-line transaction oriented system. The decision to provide continuous operation requires spreading the work across multiple processors. Immediately, efficient interprocessor communication becomes top priority. Any processor in the system must be able to absorb the workload of any other processor without disruption or loss of data integrity.

Shared memory has been a popular answer to the problems of interprocessor communication, but as a potential single point of failure, it is unacceptable for NonStop® operation. Even if the single point of failure problems could be overcome, contention for the shared resource creates an unacceptable bottleneck, severely inhibiting performance and limiting system expansion.

The volume of interprocessor communication required to support fault tolerant operation in a transaction environment is significant. Far too much to use typical I/O bus connections between processors without clogging the system and making it I/O bound. Even with Tandem's high speed 4 M Byte/sec I/O channel.

DYNABUS was the solution:

We took all interprocessor communications off conventional I/O channels and put them on a unique and extremely fast interprocessor communications link, DYNABUS. This is a dedicated, two path, bidirectional line among all processors in the system, both paths running at 13 M Byte/sec. Either path is capable of handling all DYNABUS traffic if the other path fails.

Working under its own control, DYNABUS handles all interprocessor traffic for program assignments, job/data routing, priority decisions, health checks and housekeeping.

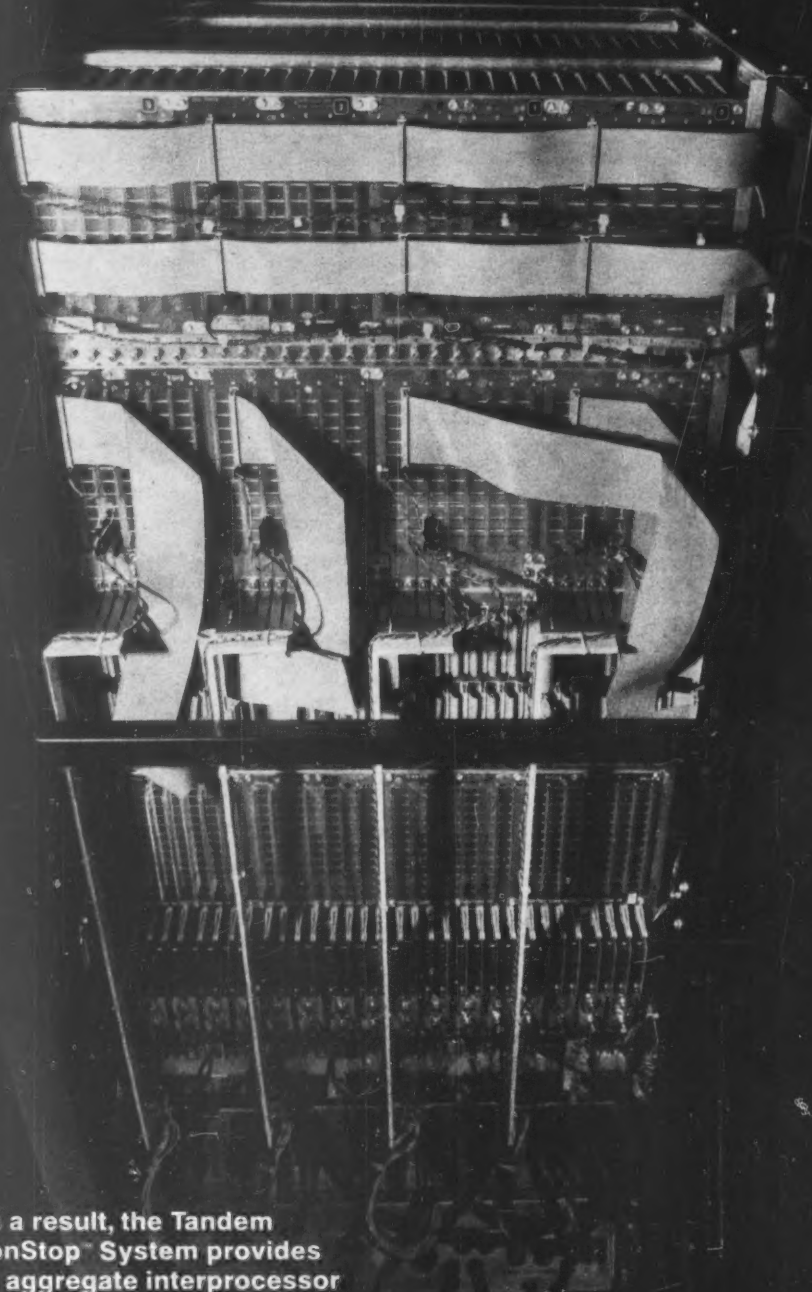
The DYNABUS contribution to performance is profound. Our multiple computer system has an effective four lane, no speed limit "data freeway" which doesn't become a bottleneck as the number of processors in the system is increased. Built-in buffers and packet multiplexing support optimal use of bandwidth.

As a result, the Tandem NonStop® System provides an aggregate interprocessor communications bandwidth of over 20 M Bytes/sec, even in a fully configured 16 processor system.

One more reason this system is a whole generation ahead. Call or write for complete information. Tandem Computers Incorporated, 19333 Vallco Parkway, Cupertino, California 95014 USA. TOLL FREE: 800-538-3107 or (408) 725-6000 in California.

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Supershorts

Harris Corp. has formed a new operating division in Dallas with approximately 900 employees to handle field service and customer support for its Information Systems Group serving the U.S. and Canada.

Tandy Corp. and Matra SA of France have reached an agreement in principle to set up a microcomputer manufacturing operation in France, which will initially manufacture the TRS-80 Model III microcomputer to be sold through the Tandy retail organization in the European Common Market.

Control Data Corp. has expanded by adding two new business centers in Atlanta to provide products, services and training specifically for local small businesses.

Compudyne has changed its name to Intelligent Communications Networks, Inc. (Incomnet) as part of an expansion campaign.

The Logical Machine Dealers Association, an independent organization, has been formed by Logical Machine dealers to exchange ideas, methods and procedures and to support new dealers.

Periphonics Corp., designers and manufacturers of computer systems that are able to speak in the human voice, has announced the opening of a new recording center at its headquarters in Bohemia, N.Y.

Codex Corp. has obtained a judgment in its favor from the patents court of UK that declares the Codex patent on its modulation technique for 9,600 bit/sec modems was valid and had been infringed by Racal-Milgo, Ltd. The court ordered an injunction against further infringement, delivery to Codex of infringing modems, payment in Codex of costs of the action and payment to Codex of Racal-Milgo, Ltd. profits on infringing modems. The injunction and delivery were suspended pending an appeal.

Executive Corner

• Fred G. Beck has been named a vice-president at Intersil, Inc.

• G. William Way has been promoted to vice-president at DTSS, Inc.

• Novell Data Systems, Inc. has promoted Jack L. Davis to the newly created position of executive vice-president and general manager; Larry C. Edwards has been named vice-president of marketing; and Lowell A. Woodbury has been promoted to vice-president of advanced development.

• Harlan C. Chase has been promoted to vice-president of Southwest Operations for the Applied Technology Division of Computer Sciences Corp.

• Richard Ralston has been promoted to corporate vice-president and general manager at Storage Technology Corp.

• J.T. O'Brien has been promoted to vice-president of marketing at Carta Associates, Inc.

MDS Qantel Corp. will open software training centers in Chicago and Cleveland to complement its existing centers in Hayward, Calif. and Cherry Hill, N.J.

Wang Laboratories, Inc. has entered into an agreement with Computerland, Inc. to allow 175 Computerland franchised retail stores in the U.S. and Canada to begin selling immediately its single station word processor, the Wangwriter, its related products and any future enhancements.

National Semiconductor Corp. has announced a reduced work schedule at its Semiconductor Division to keep its inventories in balance while maintaining present employment levels. In keeping with its no-layoff policy, the company will reduce its work schedule two days in August, two days in September and four days in December.

GTE Telenet Communications Corp. has formed an OEM marketing group headed by Vice-President Robert O'Harrow for the sale of its data communications network products.

Four-Phase Systems, Inc. has entered into an agreement with the Industrial Development Authority of Ireland under which it will establish a development center in Cork, Ireland.

Restrictions Choking Sales

(Continued from Page 53)

American countries, Brazil in particular, as those that have the most onerous restrictions on outside investment. But he noted there are similar problems in many areas of the world.

"By way of contrast," he said, "with a very few minor exceptions the U.S. gives free and open access to foreign investors." He approved of that, but said, "U.S. policy should not only be firm in its support of free flows of investment among nations, it should promote interests in establishing investments in other countries. It currently does not."

Aside from the need to establish local facilities to sell and service products, Thomas also noted foreign direct investment is important to the U.S. economy as a whole. He said U.S. overseas direct investment generated a net income to the U.S. of \$24.7 billion in 1979.

The apparent U.S. policy of neutrality on international investment is causing increased concern, Thomas said. "The effects of investment restrictions are being felt and there has been puzzlement over the U.S. position."

Calling on the U.S. to promote a policy of equivalency among nations on this issue, Thomas said, "We do have a policy that reflects this country's commitment to free and open trade and investment flows. What we need is to be more aggressive in persuading other countries to adopt identical policies."

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Computer-Aided Manufacturing International, Inc. announced acquisition of a 32/7780 supermini from Systems Engineering Laboratories, Inc.

Perkin-Elmer Corp. has been awarded a contract by Compagnie Generale de Geophysique, headquartered in France, to provide a quantity of the firm's recently announced Model 3232 32-bit superminis.

The city of New Haven, Conn., has purchased the Local Government Financial System from American Man-

agement Systems, Inc. to support financial budgeting, reporting and control.

Barnett Banks of Florida, Inc. has awarded Docutel Corp. a contract for 100 Total Teller 2300 automated teller machines.

Cray Research, Inc. will install a two-million word Cray-1/S computer system, valued at \$10.6 million, at the National Magnetic Fusion Energy Computer Cen-

ter in Livermore, Calif. The computer system initially will be leased, with conversion to purchase expected later this year.

The Sweeney Computing Corp. has received an order from Randolph Surgical Supply Co. for its DRS Order Entry System. Installation is planned for mid-September.

GTE Data Services, a wholly owned subsidiary of Gen-

eral Telephone & Electronics Corp. (GTE), has installed a triple-processor Honeywell, Inc. DPS 8/70 large-scale computer system to provide remote data processing services to GTE's telephone and manufacturing subsidiaries.

Dynamics Research Corp. has installed two Honeywell, Inc. large-scale computers, valued at \$2.2 million: a DPS 8/20 and a DPS 8/52 to support the engi-

neering services the systems division provides to the Department of Defense and to its nondefense-oriented customers.

Thomas and Howard Co. has placed an order with Sperry Univac worth \$1.4 million, for six Univac System 80 computers, related equipment and software.

ASI Teleprocessing, Inc. has installed its first Nucleus 5000 minicomputer-based communications processor as the 12th node in the private data network developed by the firm for the Bank of New York, which permits many different types of computers and peripherals within the network to communicate with each other.

The West Virginia Board of Regents has purchased the College and University Financial System from American Management Systems to be used in the statewide college and university system for financial management and reporting and for accounts payable.

Frontier Federal Savings and Loan Association has signed a contract to purchase from Diebold, Inc. 10 9000 Series Total Automatic Banking Systems to establish a Frontier 24 network in seven different off-premise locations throughout Oklahoma.

Boeing Computer Services Co. (BCS) has won a competitive evaluation conducted by the Commonwealth of Pennsylvania based on a proposal submitted by the BCS Philadelphia office to provide an integrated telecommunications network for statewide data processing centers.

Sperry Univac has received orders from the following companies for System 80 computers: Carolina Canners Corp.; Davis Junior College of Business; Stewart Data Services, Inc.; and Global Associates, Inc.

Orders & Installations



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Canadian Regional Marketing Office, 410 Consumers Rd. WILLOWDALE, Ontario M2J 4H1 (416) 498-9780



Mergers & Acquisitions

Automated Data Processing, Inc. has acquired 100% of the stock of **Allied Financial Services, Inc.**

Pacific Business Data Systems and Computer Alternatives, Inc., both Alpha Micro dealers, have merged, creating a new company that retains the name of **Computer Alternatives** and now has combined gross sales of \$7 million.

Insurance Network Systems, Inc. has acquired the Insurance Division of **ASP Network Services, Inc.** Included in the acquisition is the Agency/Brokerage Management System, the existing agent/client base and computer and network resources.

Reliance Consulting Group, Inc. has announced the acquisition of **Herbert W. Davis and Co.**

Control Data Corp. has acquired the stock of **Information Systems Design, Inc.**, a data processing services company.

University Computing Co. has acquired the Systems Di-

vision of **American Valuation Consultants**, a subsidiary of **Valuation Research Corp.** The acquisition includes four financial software systems, a customer base of 300 clients and a staff of more than 30 who market and support the business.

Storage Technology Corp. has completed acquisition of **Star Systems Divisions of Exxon Enterprises**, a division of **Exxon Corp.**, for an undisclosed amount of cash.

The merger of **Bunker Ramo Corp.** into a subsidiary of **Allied Corp.** has been approved at a special **Bunker Ramo** shareholders meeting. Under terms of the merger, former shareholders of **Bunker Ramo** will receive one \$6.74 Series C cumulative convertible preferred share of **Allied** for each of their **Bunker Ramo** shares. Each **Allied** new preferred share is convertible into .786 of a share of **Allied** common stock.

Electronic Data Systems Corp. (EDS) has finalized terms of its purchase of **Cunadadata Corp.** **Cunadadata** per-

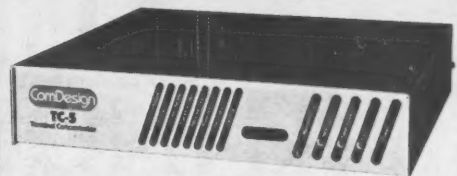
sonnel will become **EDS** employees and continue to serve **Cunadadata** customers.

M/A-COM, Inc. has signed an agreement in principle with **Sigma Data Computing Corp.** and its subsidiary company, **Sigma Data Services Corp.**, whereby **Sigma** would become a **M/A-COM** company.

Evolution Technologies, Inc. (ETI) and **Communications Dynamics, Inc. (CDI)** are presently conducting discussions towards the potential acquisition of **CDI** as a wholly owned subsidiary of **ETI**.

Westinghouse Learning Corp.'s Datascore Systems recently purchased the **McAuto Educational Services** product line from **McDonnell Douglass Automation Co.**

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The Securities and Exchange Commission has postponed until Sept. 14 hearings to determine whether to suspend the effectiveness of **CGA Computer Associates, Inc.'s** recent registration statement.

\$\$\$

Comdisco, Inc. has de-

clared a quarterly cash dividend of .07 cents per share, representing the company's nineteenth consecutive quarterly dividend since cash dividend payments began in 1977. Earnings for the third quarter ending June 30 were \$4,075,000, or .52 cents per share.

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(Quality Assurance Engineers)—BSEE, BS Physics, or BS Computer Science or Operations Research required; 2-5 years experience in Semiconductor Manufacturing and knowledge of Statistical Analysis, Process Control and/or Component Test Philosophies.

(Test Equipment Engineers)—BSEE or Physics with electronic circuit theory and instrumentation experience; 2-5 years in Test Equipment field.

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DATA BASE SPECIALISTS

Requires background in DMS-1100 or similar DBMS with two or more years experience in performing SYSGEN's local code changes, assisting project design and general data management functions. Knowledge of DEC PDP 11/34 and 11/70 BASIC PLUS used in Data Processing time sharing system also needed. This can stand alone or in addition to DMS-1100 experience.

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This is the senior technical position in the department and requires an individual with experience in DOS/VSE, SYSGEN, CICS and VSAM. Background with VOLLEIE a plus.

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These positions require individuals with a BS degree, good writing skills and a minimum of 4 years' experience in commercial applications. Exposure to ANS-COBOL a plus.

PROGRAMMER/ANALYSTS

Qualified candidates must have 3 or more years of COBOL background. Experience in a DOS/VSE or DOS/VSE environment required. CICS, ADABAS, VSAM or VOLLEIE exposure a plus.

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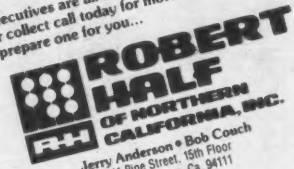
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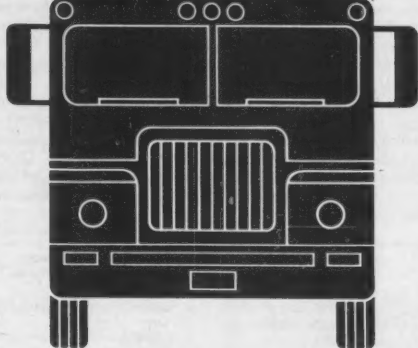
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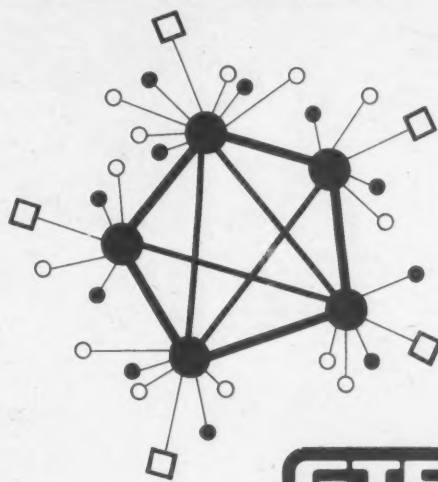
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or send resume and salary history, in confidence, to: Recruiting Department, United Telecom Computer Group, P.O. Box 8551, Kansas City, MO 64114.



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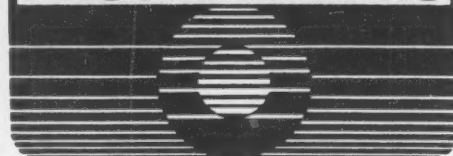
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Administrative Systems Search Committee

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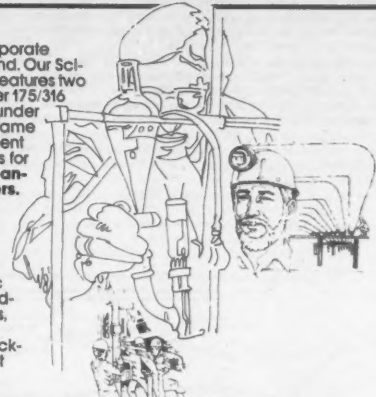
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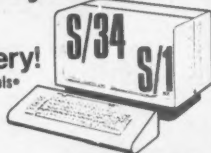
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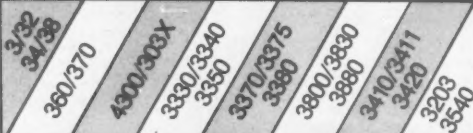
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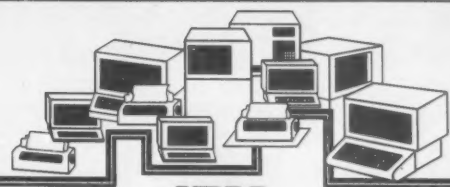
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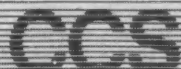
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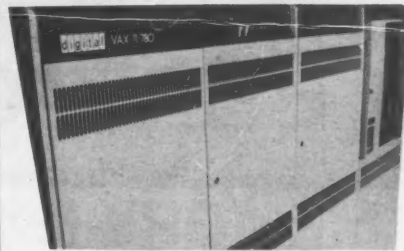
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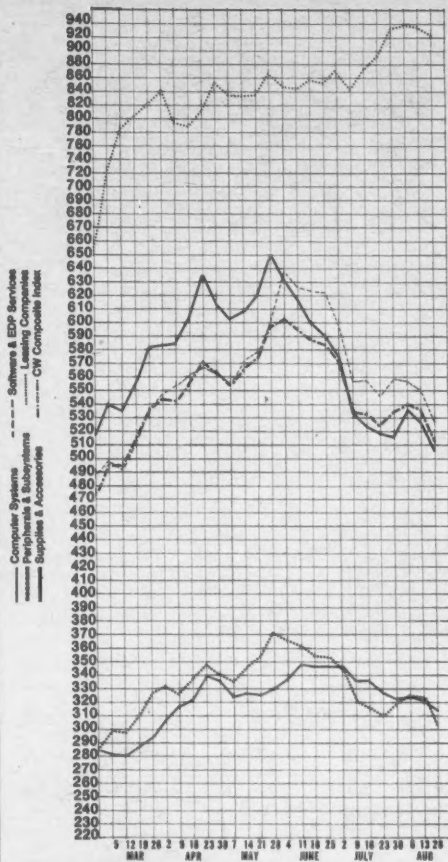
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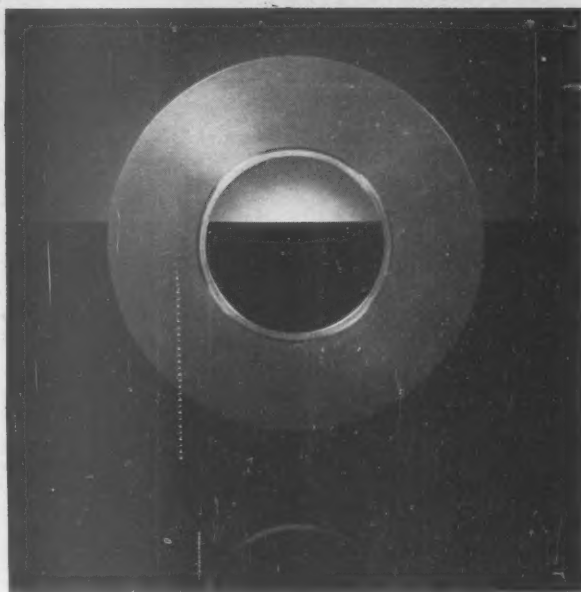
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E X C H	1980-81 RANGE (1)	PRICE				E X C H	1980-81 RANGE (1)	PRICE				E X C H	1980-81 RANGE (1)	PRICE				E X C H
		CLOSE AUG 19 1981	WEEK NET CHNGE	WEEK PCT CHNGE	CLOSE AUG 19 1981			WEEK NET CHNGE	WEEK PCT CHNGE	CLOSE AUG 19 1981	WEEK NET CHNGE			WEEK PCT CHNGE				
COMPUTER SYSTEMS																		
A ANDAHL CORP	23-46	31	-3	-9.8	O ADVANCED COMP TECH	3-8	4 3/4	-1	-17.3	A DATA ACCESS SYSTEMS	6-23	8 7/8	-1/4	-2.7				
N BURROUGHS CORP	34-72	34 3/8	-7/8	-2.4	O ADVANCED SYSTEMS INC	10-15	12	+1 1/4	+11.6	A DATAPRODUCTS CORP	25-44	27 1/8	-2 1/2	-8.3				
N COMPUTER AUTOMATION	11-28	11 1/4	-1 1/4	-10.0	O ANACORP INC	13-19	15 1/2	-1 1/8	-6.7	A DATUM INC	5-8	2 1/4	-1	-4.0				
N CONTROL DATA CORP	80-84	70 5/8	-2 7/8	-3.9	O ANALYSTS INTL CORP	3-14	5 3/4	-1/4	-4.1	O DECISION DATA COMPUT	3-8	1 1/8	-3/4	-19.8				
N CRAY RESEARCH INC	30-48	30 1/4	-1 5/8	-5.0	A APPLIED DATA RES.	15-25	17 1/2	-1/2	-2.7	O DELTA DATA SYSTEMS	2-4	3 1/2	-1/4	-6.6				
N DATA GENERAL CORP	48-87	53 7/8	-1 7/8	-3.3	N AUTOMATIC DATA PROC	22-32	28 5/8	+1/4	+0.8	O DATARAM CORP	7-15	7 1/8	-1/4	-3.3				
N DATAPoint CORP	43-68	50 3/4	-3 1/2	-6.4	O COA COMPUTER ASSOC	7-25	7	-3/4	-8.6	O ELECTRONIC M & N	18-24	18 1/4	-1/4	-0.6				
N DIGITAL EQUIPMENT	90-113	96 1/4	-1 3/4	-1.7	O COMPUTER HORIZONS	1-5	3	0	0.0	O EVANS & SUTHERLAND	18-40	27 1/4	-2	-6.8				
A EECO INC	10-19	11 5/8	-3/8	-3.1	O COMPUTER NETWORK	4-9	4 5/8	-3/8	-7.5	O FABRI-TEK	2-8	3 3/4	0	0.0				
N ELECTRONIC ASSOC.	7-13	8 7/8	-1/8	-1.7	N COMPUTER SCIENCES	16-30	16 3/4	-1/4	-1.4	O GENERAL COMPUTER SYS	1-12	6	0	0.0				
N FOUR-PHASE SYSTEMS	18-48	33 5/8	-2 1/2	-6.9	O COMPUTER TASK GROUP	13-23	17	-1 1/4	-6.8	N GEN'L DATA CORP IND	11-18	10 5/8	-3/4	-5.5				
N FOXBORO	48-62	51 1/4	+1 3/8	+2.7	O COMPUTER USAGE	3-10	3 1/8	-1/8	-3.8	O GENERAL TERMINAL CP	1-4	1	-1	-27.2				
O GENERAL AUTOMATION	7-10	11 5/8	-3/4	-6.0	O COMSHARE	10-21	9 1/2	-2 1/4	-18.1	N HAZELTINE CORP	20-35	24 1/4	-1	-3.9				
O GRIFFIN CORP	1-3	1 1/4	0	0.0	O CULLINANE DATABASE	28-68	54 1/2	0	0.0	O INFORMATION INTL INC	8-17	13 3/4	3/4	+5.5				
N HARRIS CORP	41-80	43 1/4	-2 1/4	-4.8	O DATA DIMENSIONS INC	1-4	1 1/8	0	0.0	O INTEL CORP	30-51	30 3/4	-1/4	-0.8				
N HEMLETT-PACKARD CO	33-54	45 5/8	-3 5/8	-7.3	O DATATAB	2-4	2 1/4	-1/4	-10.0	O IPI SYSTEMS INC	10-15	8 3/8	-3/4	-7.1				
N HONEYWELL INC	82-110	90	+1/2	+0.5	O DSI CORP	4-9	5 1/2	-3/4	-12.0	O LUNDY ELECTRONICS	11-17	11 3/8	-3/8	-3.3				
N IBM	55-73	57	-7/8	-1.5	O DYATRON CORP	5-11	5 1/2	-1/4	-4.3	A HSI DATA CORP	11-27	17 1/8	-1 5/8	-8.6				
O MAGNUSON COMP SYST	18-32	17 3/4	-1	-5.3	N ELECTRONIC DATA SYST	15-30	27 3/8	+7/8	+3.3	N MEMOREX	8-18	12	-3/8	-3.0				
N MANAGEMENT ASSIST	11-28	12 1/2	-5/8	-4.7	O INFORMATICS INC	17-34	22	-1/4	-1.1									
O NINI-COMPUTER SYST	1-4	1 5/8	-1/8	-7.1	O INSYTE CORP	1-3	2 3/8	+1/8	+5.3	O NETWORK SYSTEMS CORP	17-25	18	-2 1/8	-10.5				
N MODULAR COMPUTER SYS	10-32	8 1/2	-1/4	-2.3	O IPS COMPUTER MARKET	1-4	1 3/4	0	0.0	O OREX	2-12	12	0	0.0				
N NODAK DATA SCI	18-32	18 3/8	-5/8	-3.6	O KEANE ASSOCIATES	4-8	6 1/2	0	0.0	N PARADYNE CORP	25-52	40 7/8	-2 3/8	-5.4				
N NCR	56-78	58 1/4	-1 5/8	-2.8	O LOGICON	23-38	31 1/2	+1/8	+0.3	O PERMIL CORP	11-17	10 1/2	-1 5/8	-13.4				
N PRIME COMPUTER INC	23-48	24	+1/4	+1.0	O MNOT SCI AMER INC	17-28	20 1/4	-1/2	-2.4	O RANTR CORP	10-23	14 1/8	+1/2	+3.3				
N PERKIN-ELMER	24-38	24	-1 1/8	-4.4	O MATHEMATICA INC	12-18	15	0	0.0	N RECOGNITION EQUIP	10-21	10 1/8	-1/8	-0.7				
N SPERRY CORP	40-65	40 1/4	-1	-2.4	O MATHEMATICAL APP GRP	15-28	18	-3/4	-3.7	O SCAN DATA	1-9	2	0	0.0				
O TANDEN COMPUTERS INC	13-35	29 3/4	-1 3/4	-5.5	O NATIONAL DATA CORP	14-28	18	-1 1/2	-7.8	N STORAGE TECHNOLOGY	10-18	10 1/8	-1 1/8	-3.5				
N TEXAS INSTRUMENTS	28-48	28 1/4	-1 5/8	-5.4	N PLANNING RESEARCH	8-13	8 3/8	-1/4	-3.4	O SYKES DATATRONICS	8-28	20 3/4	-1/2	-2.3				
A WANG LABS.	28-48	28 1/4	-1 5/8	-5.4	O PROGRAMMING & SYS	1-2	1 5/8	-1/8	-3.1	A T BAR INC	13-19	13 3/4	-1 3/4	-11.2				
					O RAPIDATA INC	8-11	6 1/2	-1/2	-7.1	A TEC INC	4-7	5 3/8	-5/8	-10.4				
					O REYNOLDS & REYNOLD	18-28	18 1/2	-1 1/4	-6.0	N TEKTRONIX INC	50-70	50 3/8	-2 7/8	-5.3				
					O SEI CORP	17-28	24	-1 3/4	-6.7	N TELEX	6-9	5 3/4	-3/4	-11.3				
					N STSC INC	11-28	11 1/2	-2	-14.8	O TESDATA SYSTEMS CP	17-17	8 1/2	-1/2	-6.8				
					O SCIENTIFIC COMPUTERS	8-18	8 3/4	-1/4	-2.7	N TIMEXEL INC	11-18	11 3/8	-3/8	-3.0				
					O SOFTWARE AG	23-38	18 1/2	-1 3/4	-8.5	O WILTER INC	1-3	1 3/4	0	0.0				
					N TYMSHARE INC	34-58	38 3/8	+2 3/8	+6.8									
					A URS CORP	13-18	13 1/8	-5/8	-4.5									
					N WYLY CORP	8-20	9 1/2	-5/8	-6.1									
LEASING COMPANIES																		
O BOOTH FINANCIAL CP	18-27	27 1/4	+1/4	+0.9	N AM INTERNATIONAL	11-25	12 1/2	+3/8	+3.0									
N COMDISCO INC	17-24	28	-1/4	-1.2	O ANDERSON JACOBSON	13-28	17 3/4	-3/8	-2.0	A DATA ACCESS SYSTEMS	6-23	8 7/8	-1/4	-2.7				
O COMMERCE GROUP CORP	1-2	1 1/4	0	0.0	O AUTO-TROL TECHNOLOGY	12-62	12 1/4	-1 1/4	-9.2	A DATAPRODUCTS CORP	25-44	27 1/8	-2 1/2	-8.3				
O COMPUTER INVESTRS GRP	1-4	5/8	0	0.0	O BEVITE INT'L	10-18	11	-1/4	-4.2	O DECISION DATA COMPUT	3-8	1 1/8	-3/4	-19.8				
O CONTINENTAL INFO SYS	4-9	7 3/4	-1 1/4	-13.8	A BOLT-BERANEK & NEH	17-25	18 3/4	-5/8	-3.2	O DELTA DATA SYSTEMS	2-4	3 1/2	-1/4	-6.6				
A DCL INC	2-4	3 1/4	-3/8	-10.3	O CAMBEX CORP	2-8	4 1/8	-5/8	-13.1	O DATARAM CORP	7-15	7 1/8	-1/4	-3.3				
N DPF INC	5-12	8 7/8	+1/4	+2.5	N CENTRONICS DATA CORP	10-40	8 3/4	-1/2	-6.8	O ELECTRONIC M & N	18-24	18 1/4	-1/4	-0.6				
O ITEL	1-15	7/8	0	0.0	O CETEC CORP	5-9	8 1/8	0	0.0	O EVANS & SUTHERLAND	18-40	27 1/4	-2	-6.8				
O LEASACORP	1-2	3/8	0	0.0	O COMPUTER DEVICES INC	6-10	7	0	0.0	O FABRI-TEK	2-8	3 3/4	0	0.0				
A PIONEER TEX CORP	2-4	3 1/4	-3/8	-10.3	O COGNITRONICS	5-11	7 1/2	-7/8	-10.4	O GENERAL COMPUTER SYS	1-12	6	0	0.0				
N RELIANCE GROUP INC	65-89	80 5/8	+3/8	+0.4	O COMPUTER COMMUN.	5-11	8 1/8	-3/8	-18.7	N GEN'L DATA CORP IND	11-18	10 5/8	-3/4	-5.5				
N U.S. LEASING	18-30	23 3/8	+1	+4.4	O COMPUTER CONGOLES	22-28	24 1/8	-1/2	-2.1	O GENERAL TERMINAL CP	1-4	1	-1	-27.2				
SOFTWARE & EDP SERVICES																		
O ADVANCED COMP TECH	3-8	4 3/4	-1	-17.3	O COMPUTER TRANSCIEVER	3-9	7 1/8	-1 1/4	-14.9	O INFORMATION INTL INC	8-17	13 3/4	3/4	+5.5				
O ADVANCED SYSTEMS INC	10-15	12	+1 1/4	+11.6	N COMPUTERVISION CORP	20-48	38 3/8	-3 3/4	-8.8	O INTEL CORP	30-51	30 3/4	-1/4	-0.8				
O ANACORP INC	13-19	15 1/2	-1 1/8	-6.7	O CONRAC CORP	17-28	23	-1 3/8	-5.8	O IPI SYSTEMS INC	10-15	8 3/8	-3/4	-7.1				
O ANALYSTS INTL CORP	3-14	5 3/4	-1/4	-4.1						O LUNDY ELECTRONICS	11-17	11 3/8	-3/8	-3.3				
A APPLIED DATA RES.	15-25	17 1/2	-1/2	-2.7						A HSI DATA CORP	11-27	17 1/8	-1 5/8	-8.6				
N AUTOMATIC DATA PROC	22-32	28 5/8	+1/4	+0.8						N MEMOREX	8-18	12	-3/8	-3.0				
O COA COMPUTER ASSOC	7-25	7	-3/4	-8.6														
O COMPUTER HORIZONS	1-5	3	0	0.0														
O COMPUTER NETWORK	4-9	4 5/8	-3/8	-7.5														
N COMPUTER SCIENCES	16-30	16 3/4	-1/4	-1.4														
O COMPUTER TASK GROUP	13-23	17	-1 1/4	-6.8														
O COMPUTER USAGE	3-10	3 1/8	-1/8	-3.8														
O COMSHARE	10-21	9 1/2	-2 1/4	-18.1														
O CULLINANE DATABASE	28-68	54 1/2	0	0.0														
O DATA DIMENSIONS INC	1-4	1 1/8	0	0.0														
O DATATAB	2-4	2 1/4	-1/4	-10.0														
O DSI CORP	4-9	5 1/2	-3/4	-12.0														
O DYATRON CORP	5-11	5 1/2	-1/4	-4.3														
N ELECTRONIC DATA SYST	15-30	27 3/8	+7/8	+3.3														
O INFORMATICS INC	17-34	22	-1/4	-1.1														
O INSYTE CORP	1-3	2 3/8	+1/8	+5.3														
O IPS COMPUTER MARKET	1-4	1 3/4	0	0.0														
O KEANE ASSOCIATES	4-8	6 1/2	0	0.0														
A LOGICON	23-38	31 1/2	+1/8	+0.3														
O MNOT SCI AMER INC	17-28	20 1/4	-1/2	-2.4														
O MATHEMATICA INC	12-18	15	0	0.0														
O MATHEMATICAL APP GRP	15-28	18	-3/4	-3.7														
O NATIONAL DATA CORP	14-28	18	-1 1/2	-7.8														
N PLANNING RESEARCH	8-13	8 3/8	-1/4	-3.4														
O PROGRAMMING & SYS	1-2	1 5/8	-1/8	-3.1														
O RAPIDATA INC	8-11	6 1/2	-1/2	-7.1														
O REYNOLDS & REYNOLD	18-28	18 1/2	-1 1/4	-6.0														
O SEI CORP	17-28	24	-1 3/4	-6.7														
N STSC INC	11-28	11 1/2	-2	-14.8														
O SCIENTIFIC COMPUTERS	8-18	8 3/4	-1/4	-2.7														
O SOFTWARE AG	23-38	18 1/2	-1 3/4	-8.5														
N TYMSHARE INC	34-58	38 3/8	+2 3/8	+6.8														
A URS CORP	13-18	13 1/8	-5/8	-4.5														
N WYLY CORP	8-20	9 1/2	-5/8	-6.1														
PERIPHERALS & SUBSYSTEMS																		
N AM INTERNATIONAL	11-25	12 1/2	+3/8	+3.0														
O ANDERSON JACOBSON	13-28	17 3/4	-3/8	-2.0														
O AUTO-TROL TECHNOLOGY	12-62	12 1/4	-1 1/4	-9.2														
O BEVITE INT'L	10-18	11	-1/4	-4.2														
A BOLT-BERANEK & NEH	17-25	18 3/4	-5/8	-3.2														
O CAMBEX CORP	2-8	4 1/8	-5/8	-13.1														
N CENTRONICS DATA CORP	10-40	8 3/4	-1/2	-6.8														
O CETEC CORP	5-9	8 1/8	0	0.0														
O COMPUTER DEVICES INC																		

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=INTERNATIONAL; W=WEST; O=OVER-THE-COUNTER
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